

**SAMSUNG**

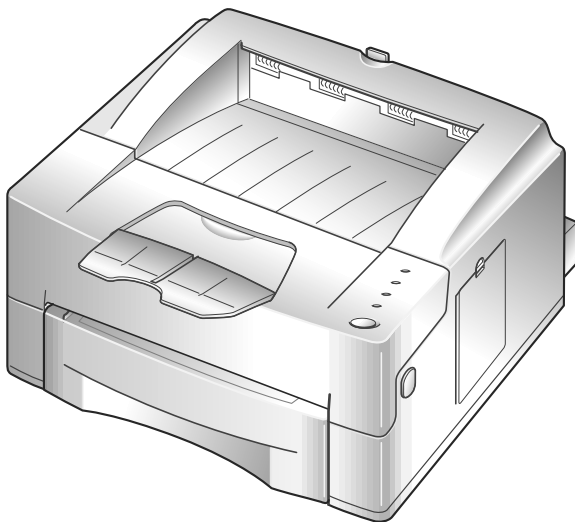
# **LASER PRINTER**

**ML-6050**

**QwikLaser 6050**

# ***SERVICE* MANUAL**

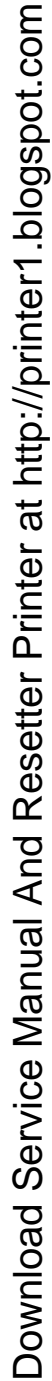
## **LASER PRINTER**



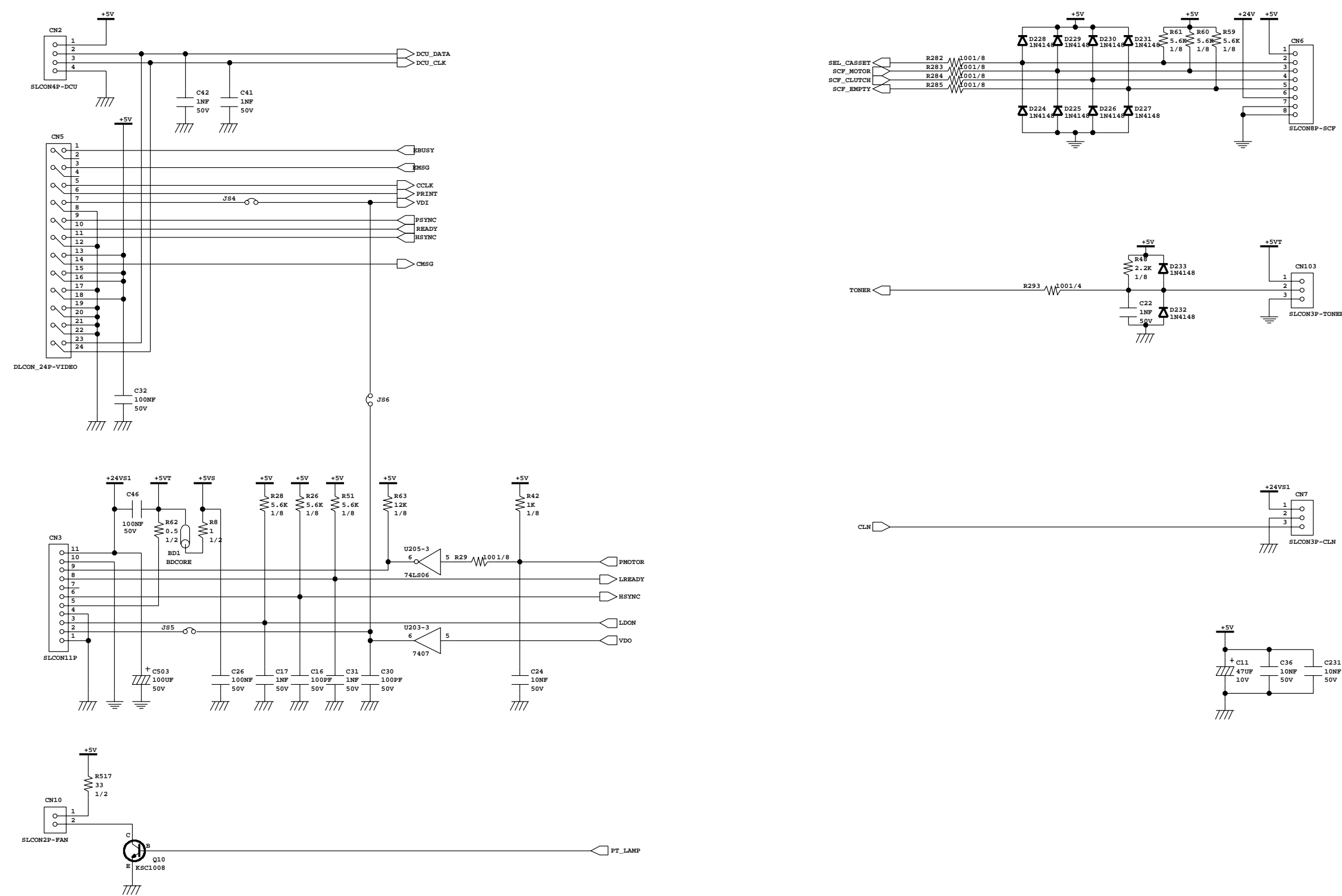
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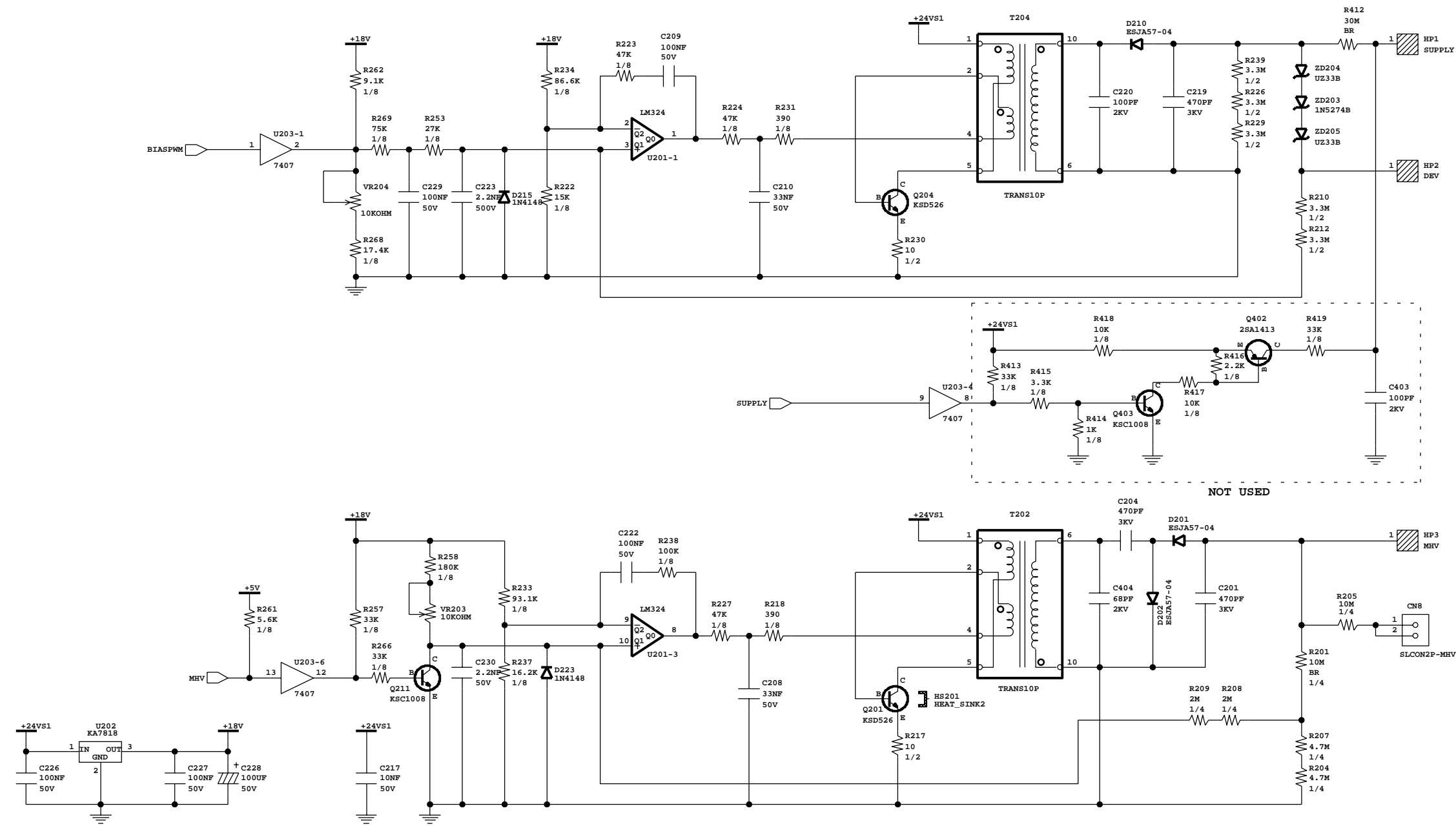
## 8-1. Engine Controller (1/6)



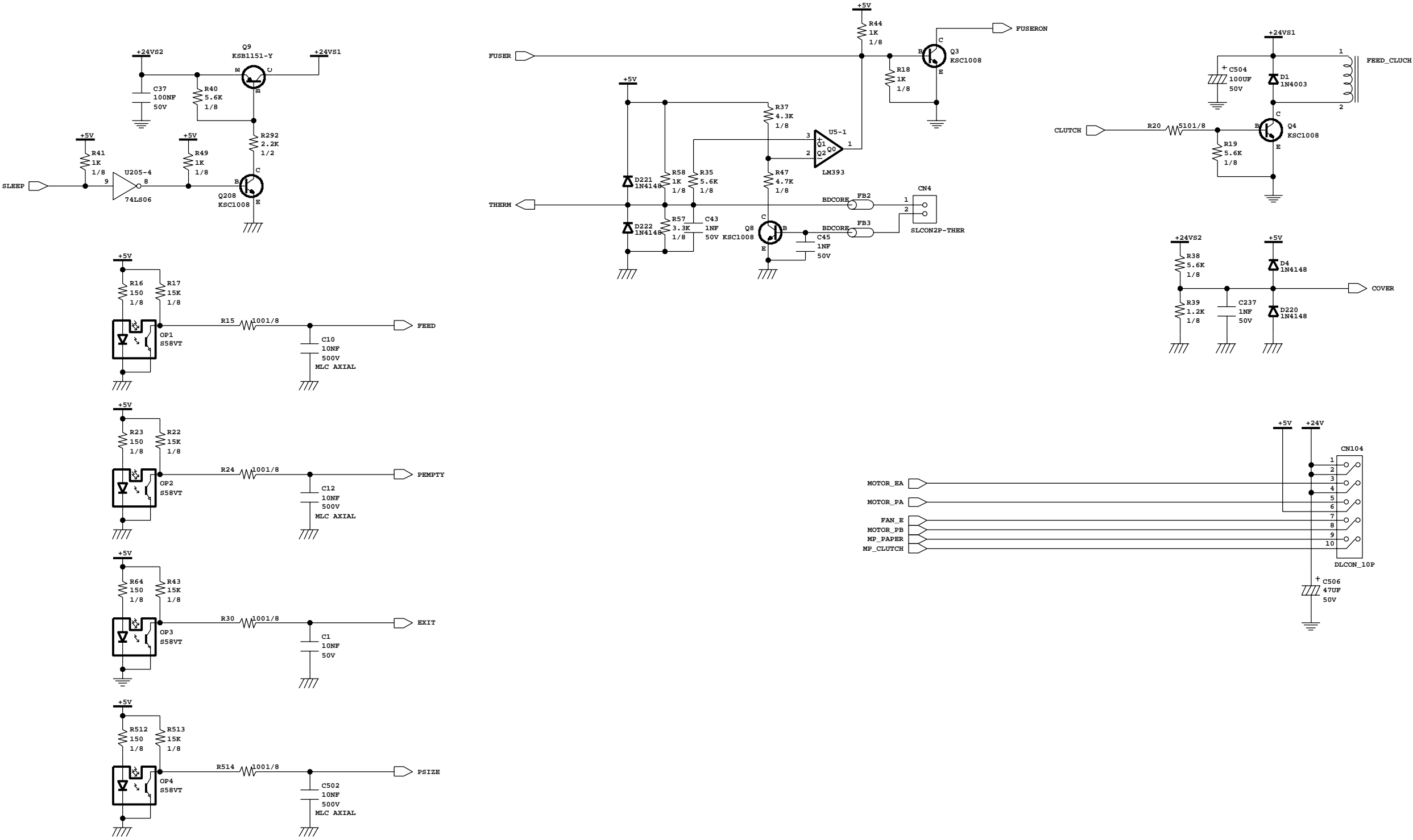
Engine Controller (2/6)



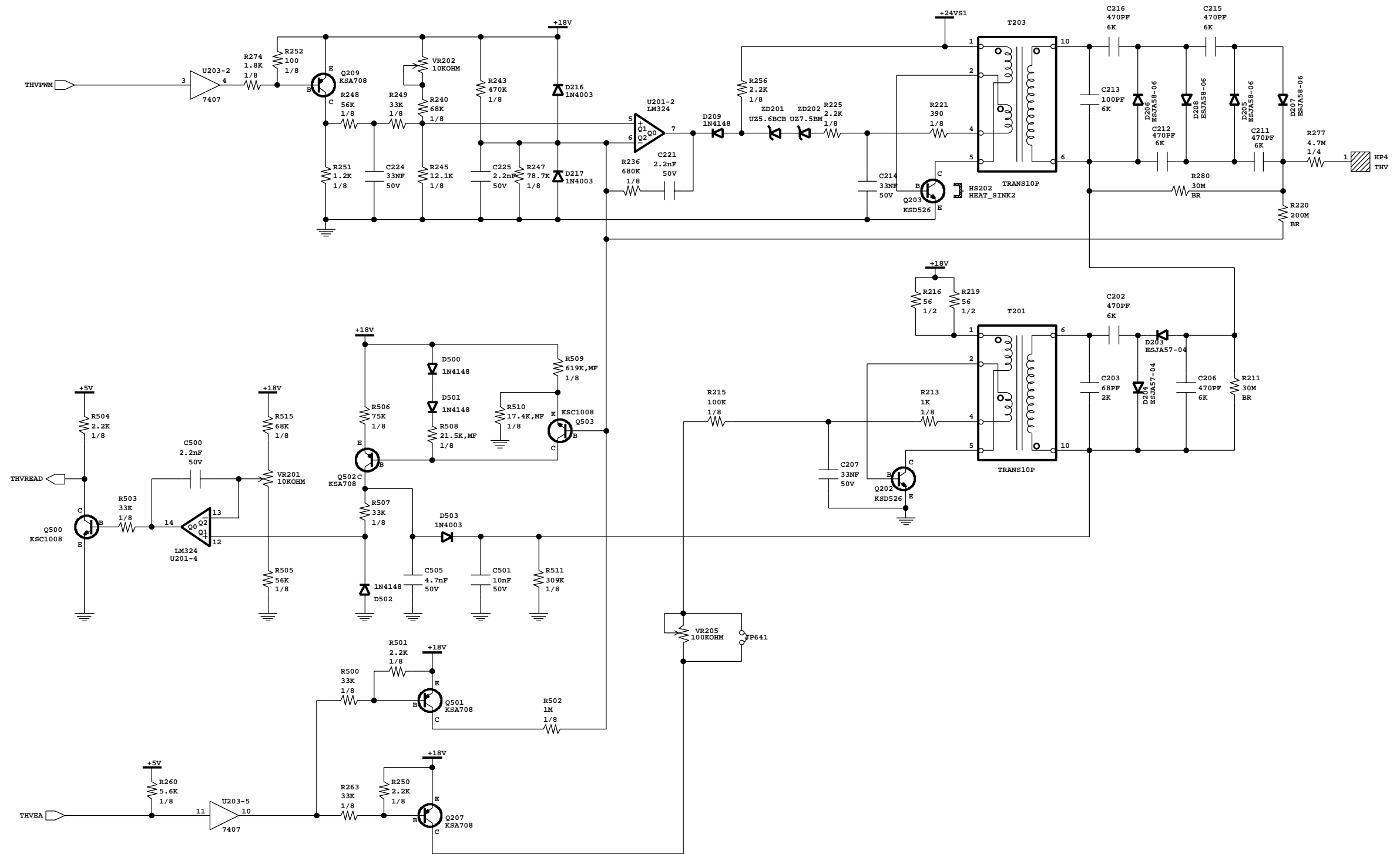
Engine Controller (3/6)



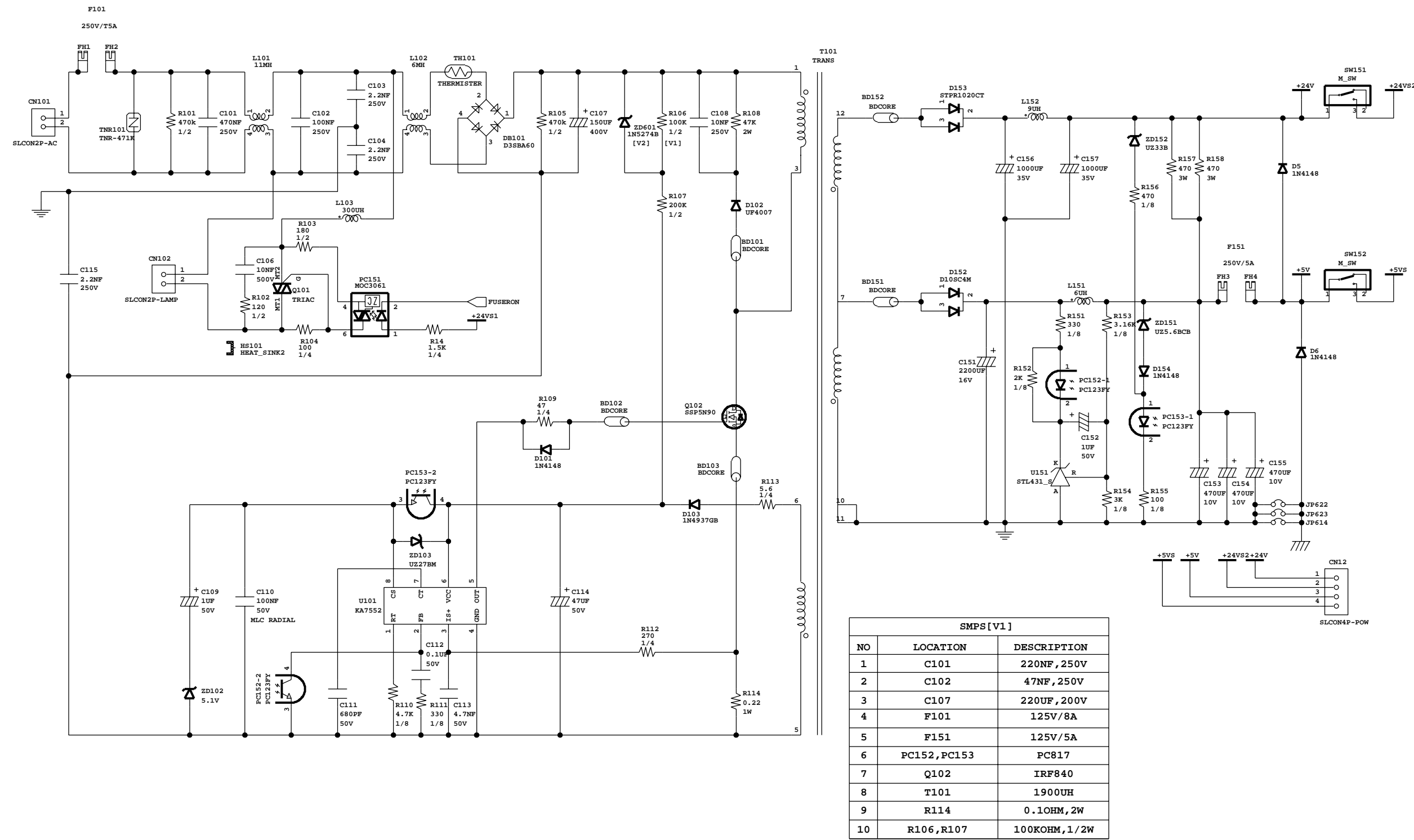
Engine Controller (4/6)



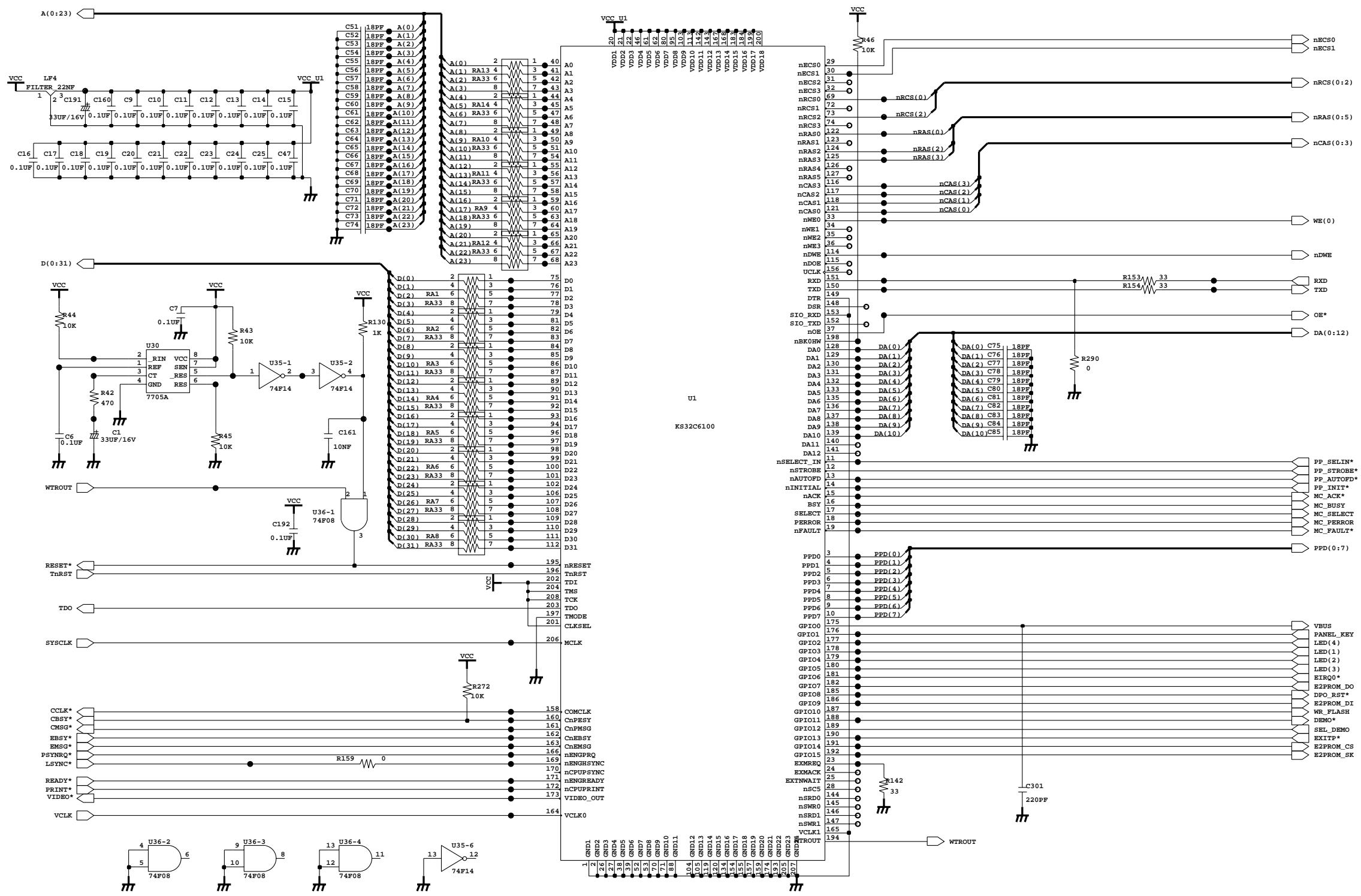
## Engine Controller (5/6)



Engine Controller (6/6)

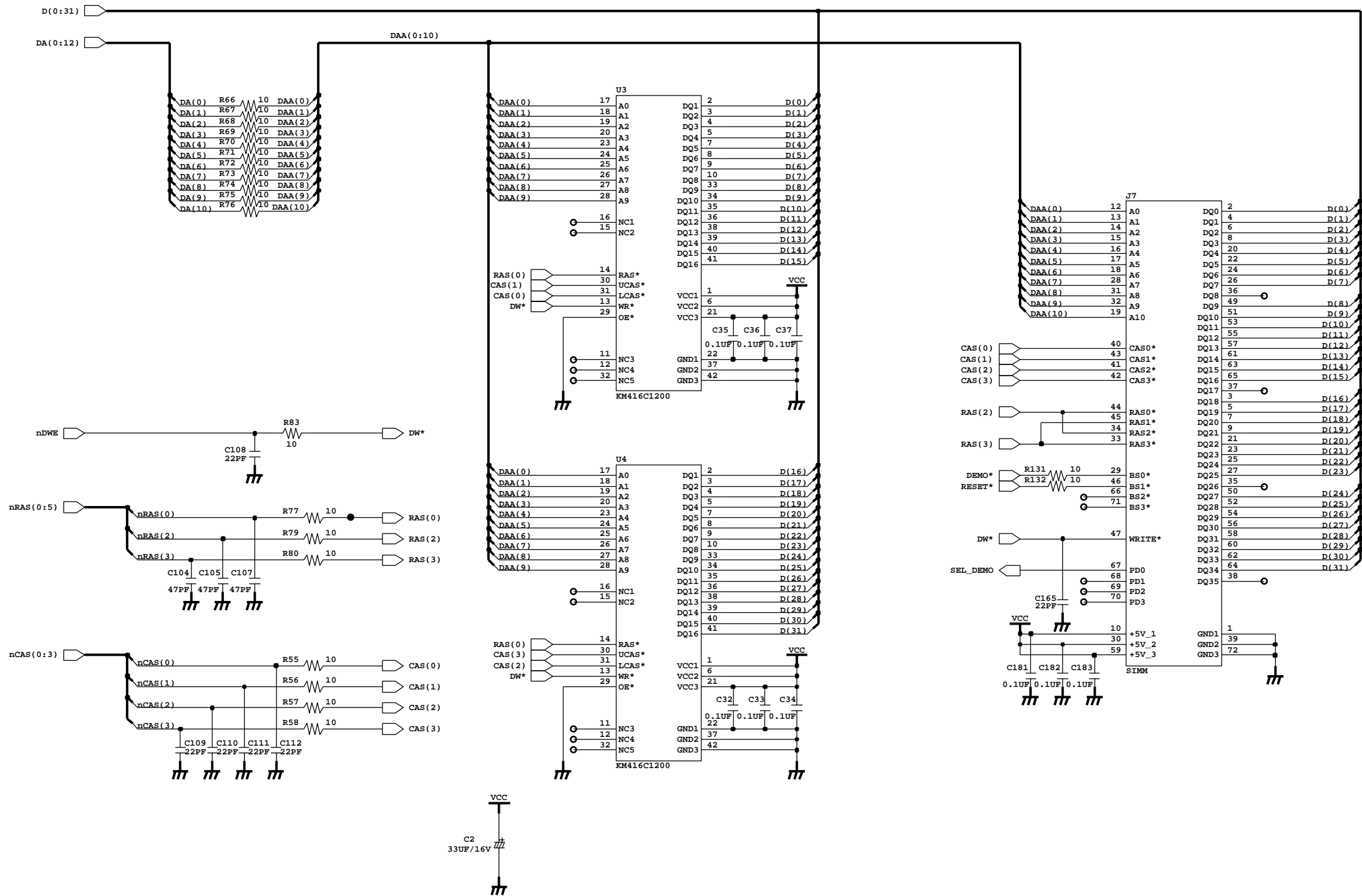


8-2. Controller Diagram(1/10)

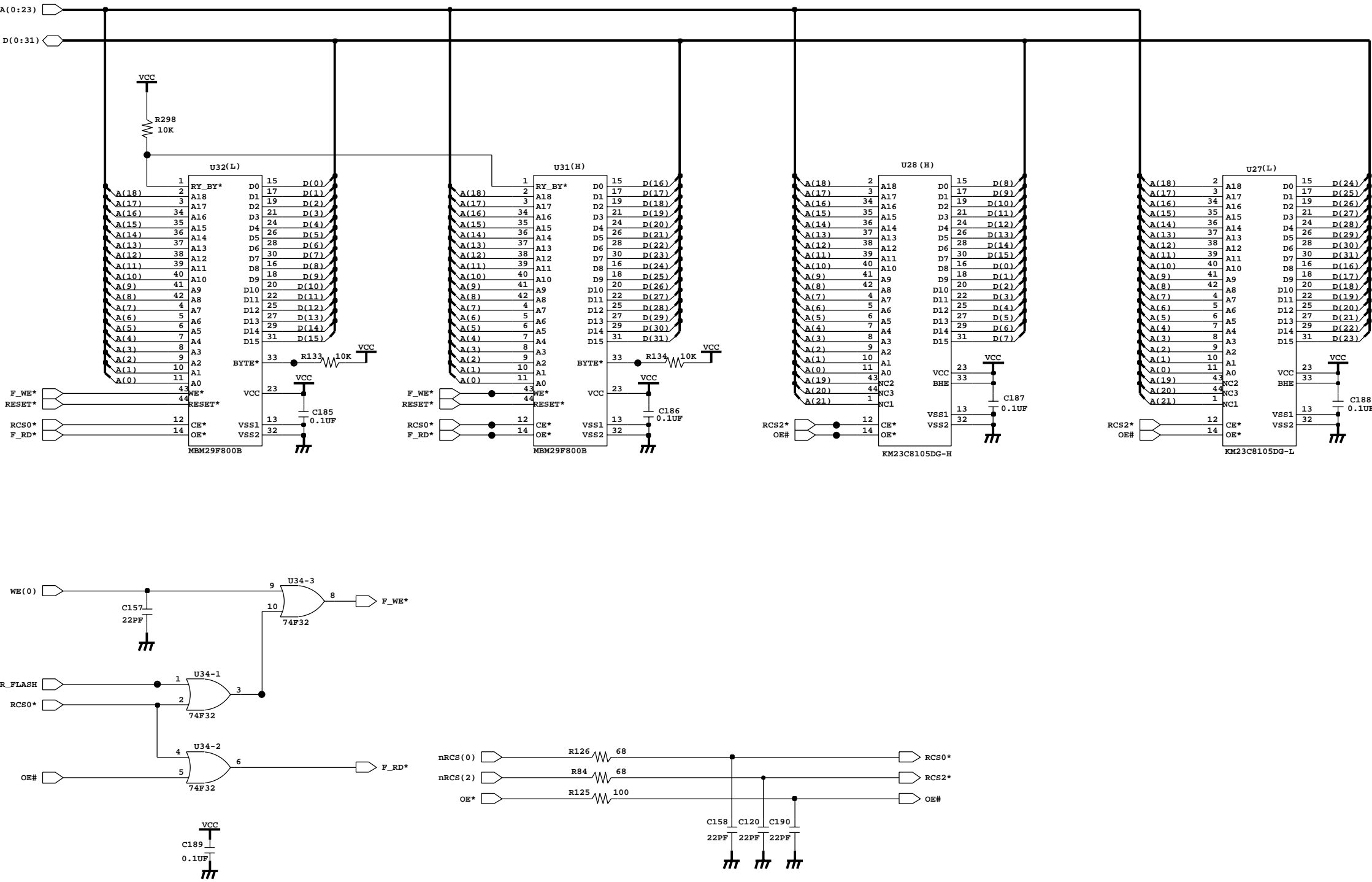




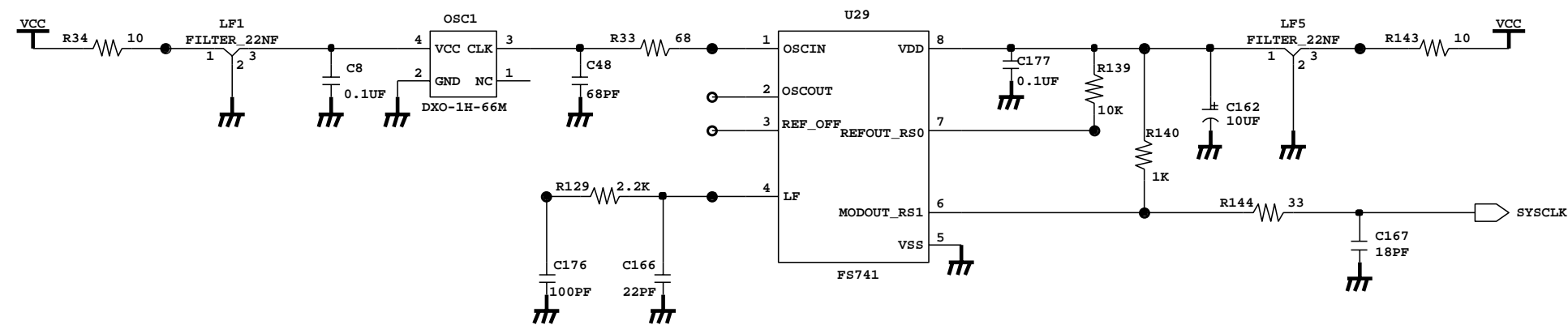
Controller Diagram(2/10)



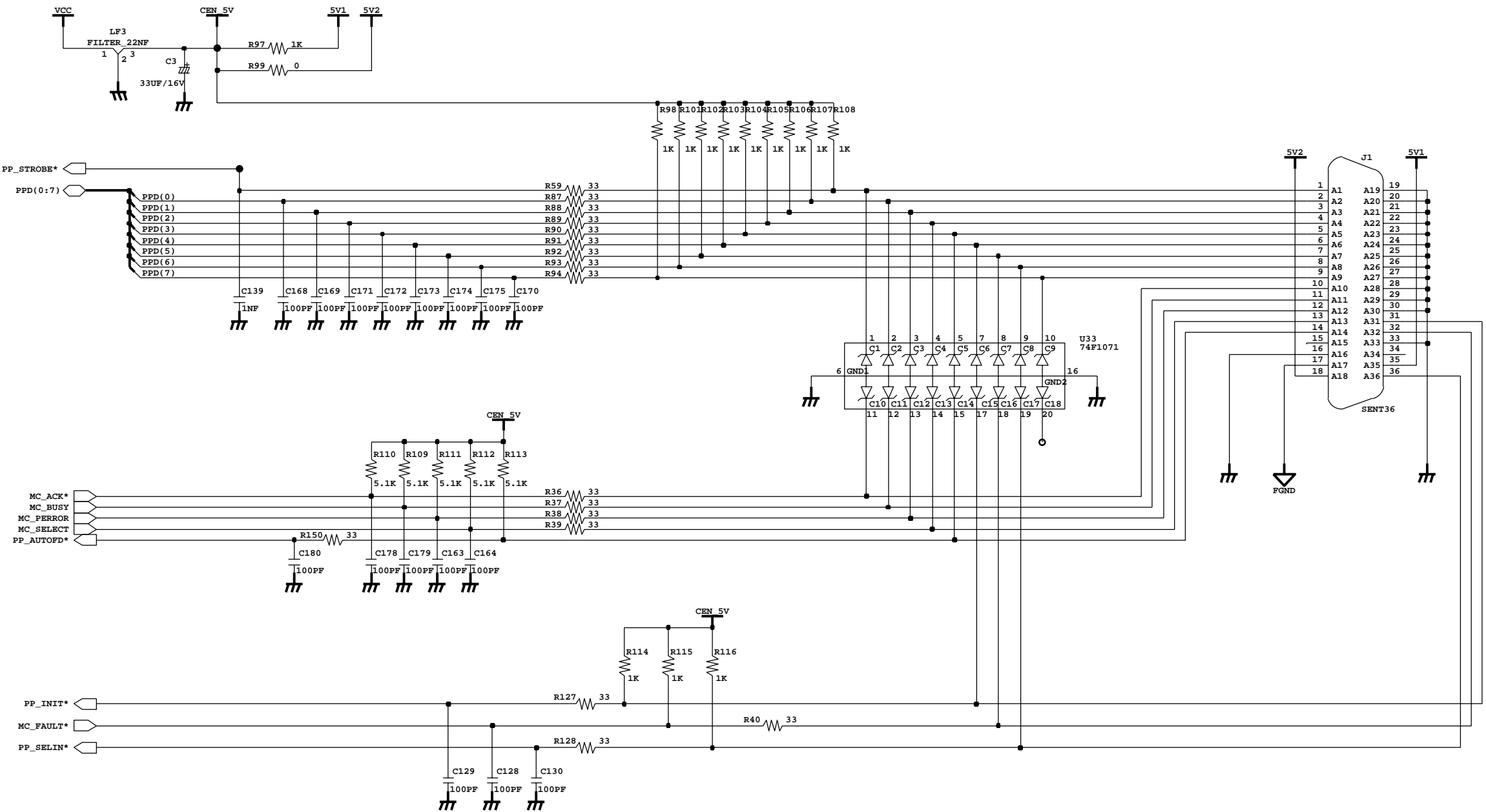
Controller Diagram(3/10)



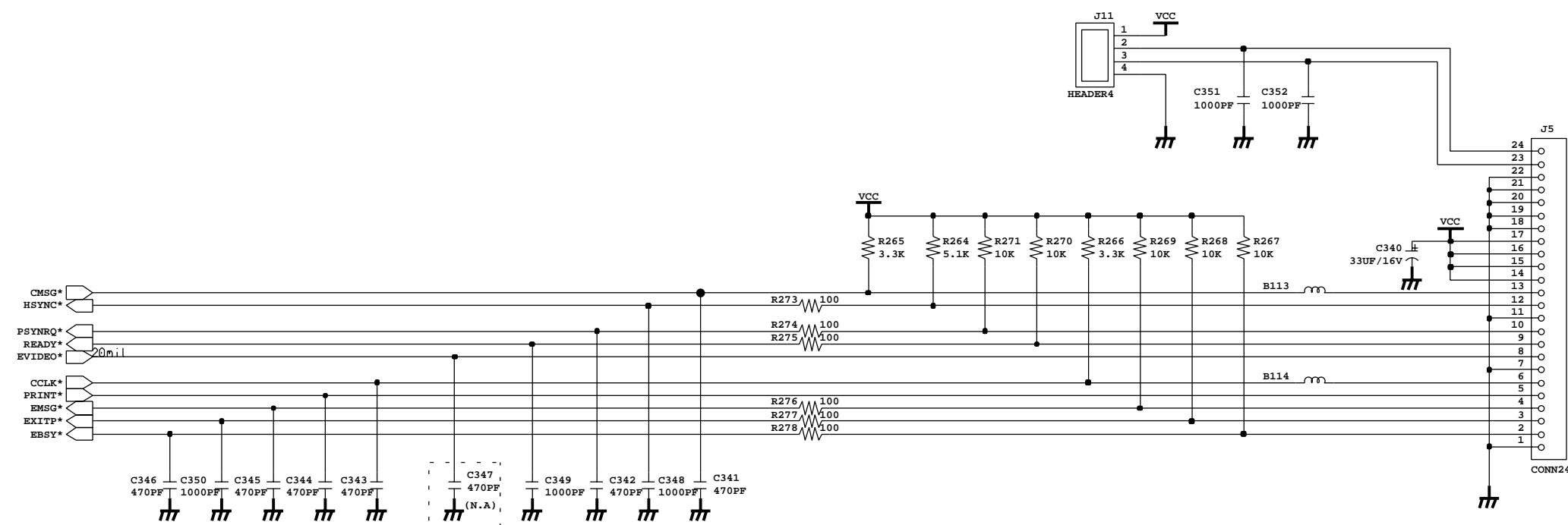
Controller Diagram(4/10)



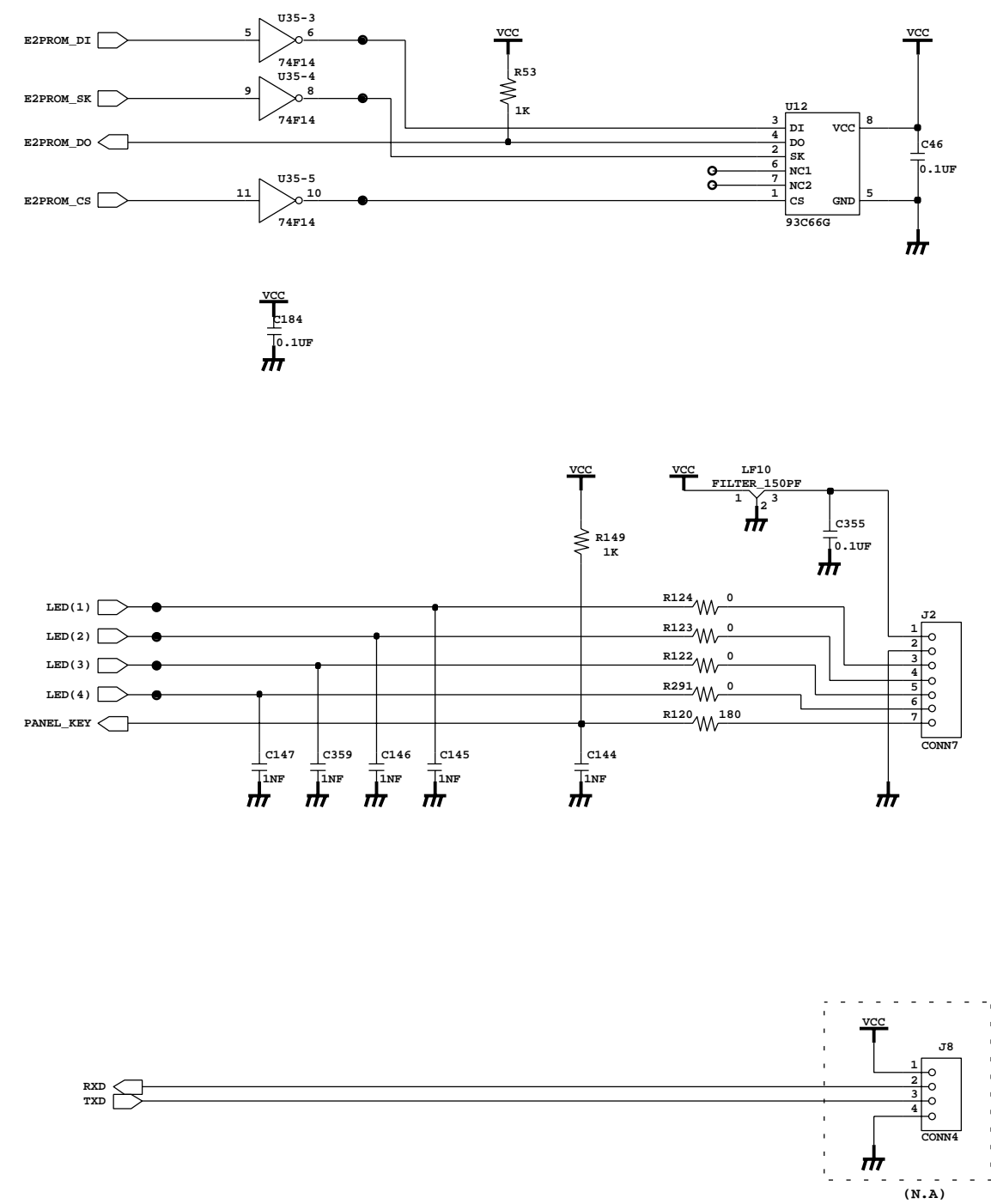
Controller Diagram(5/10)



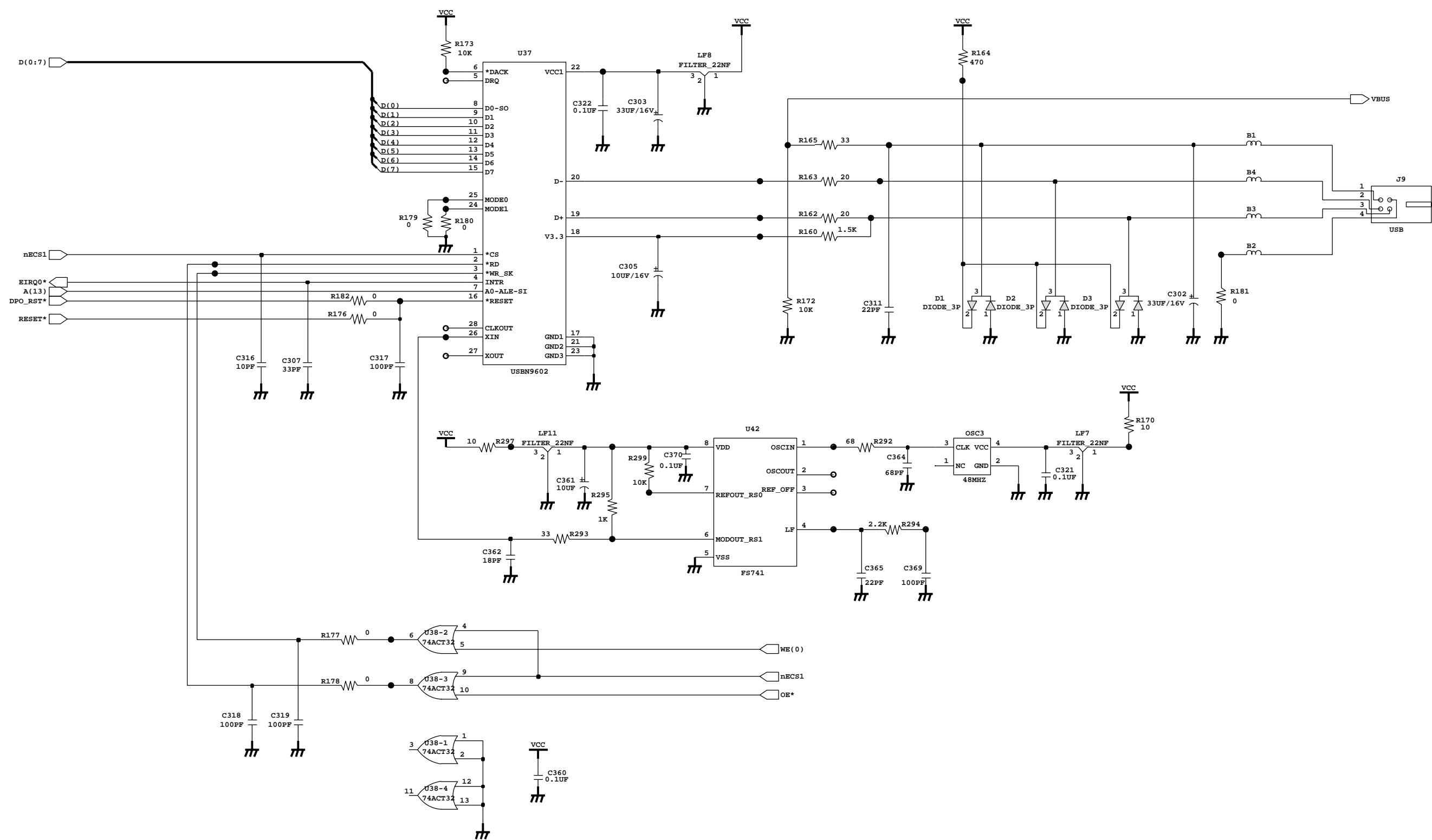
Controller Diagram(6/10)



Controller Diagram(7/10)



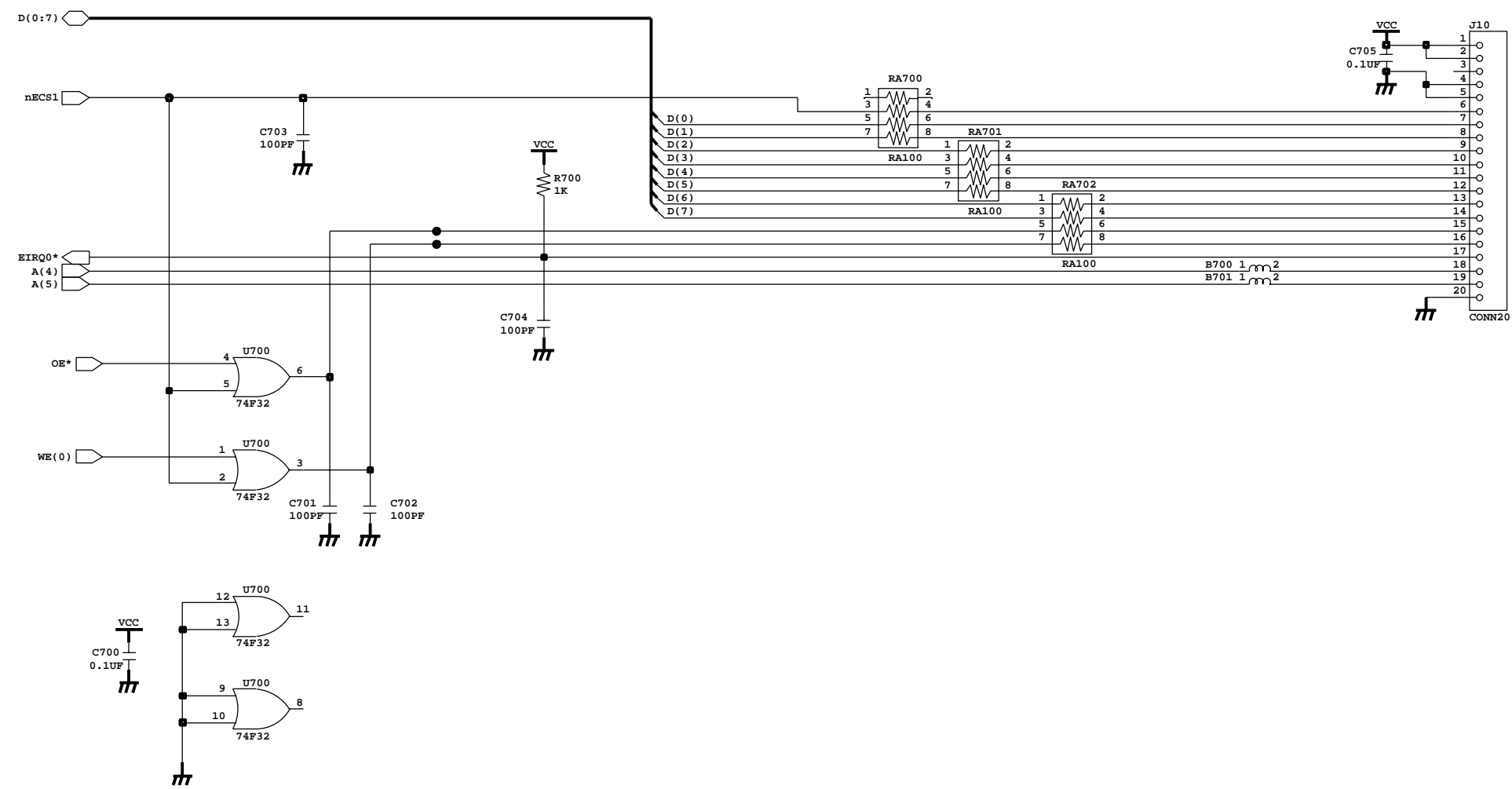
Controller Diagram(8/10)



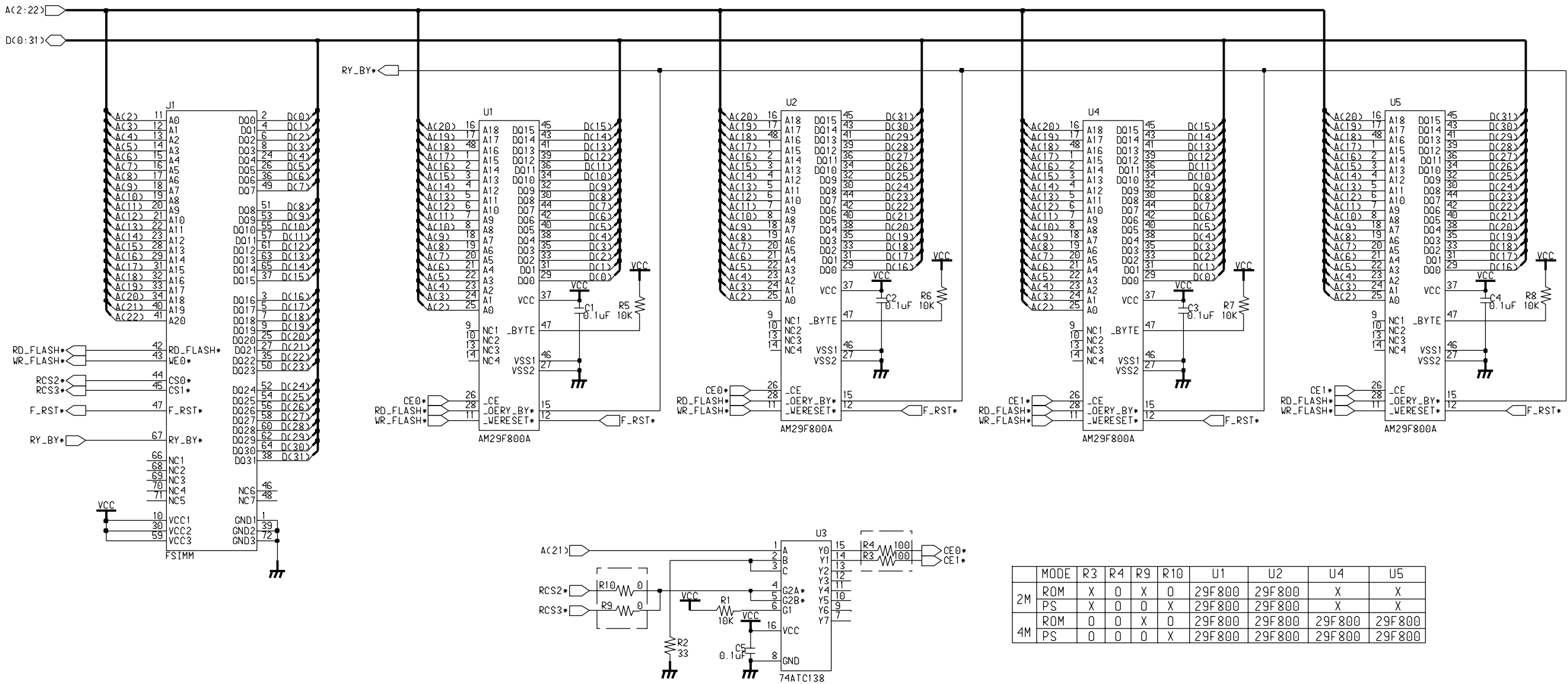


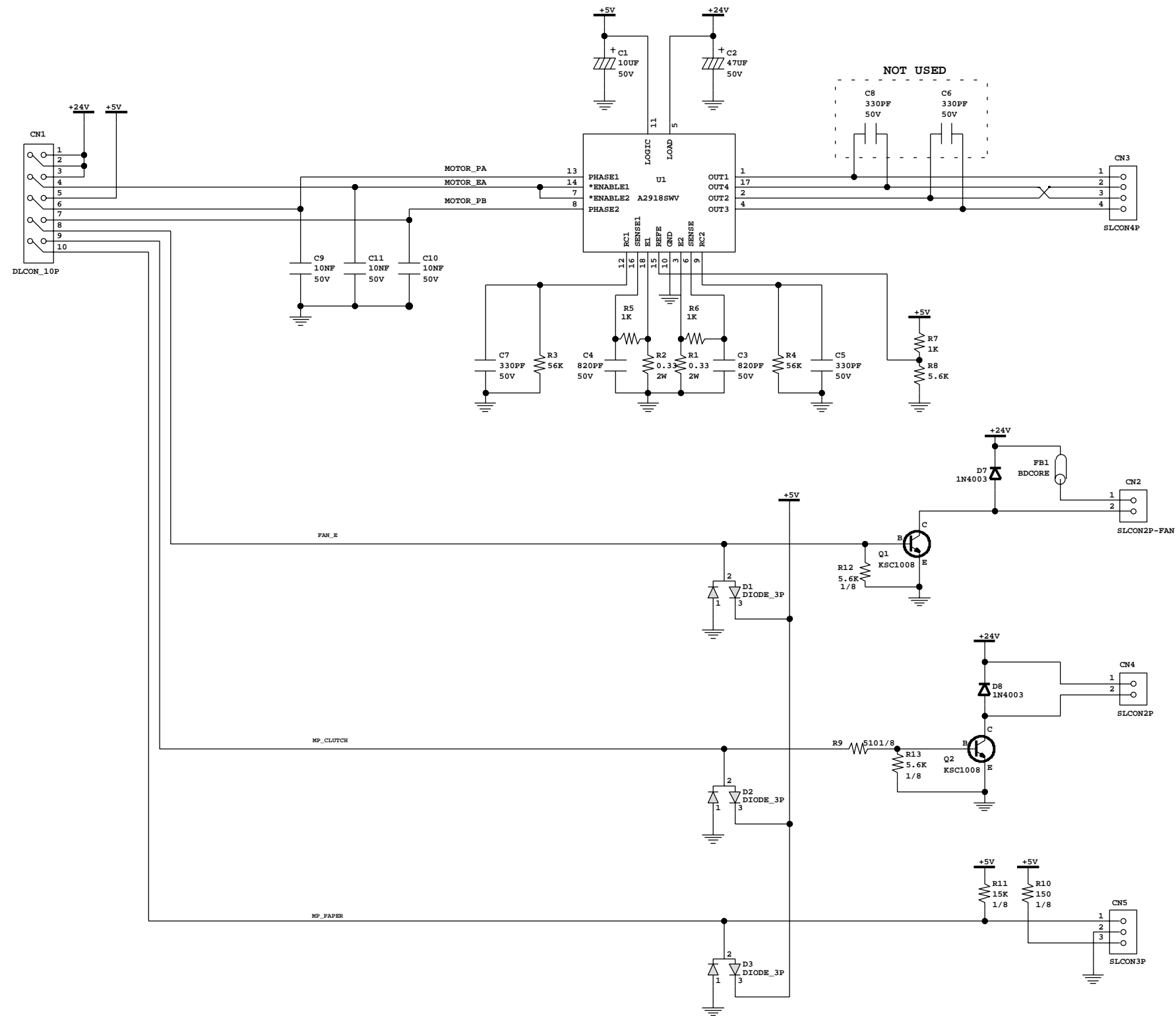


Controller Diagram(10/10)

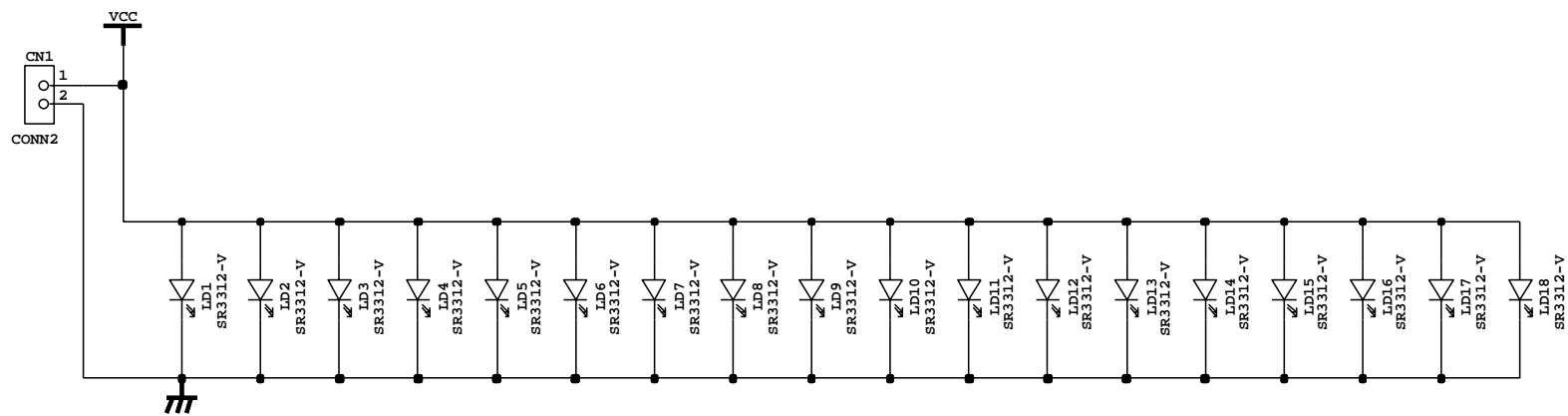


8-4. Flash SIMM





8-7. PTL Diagram



## 7. Electrical Parts Lists

### 7-1. Engine PBA

#### 7-1-1. Engine PBA (ML-6050 : 110V)

| SEC. Code          | Location No.           | Description          | Spec                                |
|--------------------|------------------------|----------------------|-------------------------------------|
| <b>JC92-01047A</b> |                        | <b>ENGINE (110V)</b> |                                     |
| 0201-000008        | -                      | ADHESIVE-HM          | PP_#3748, WHT, 6500CPS, -           |
| 1102-000239        | U2                     | IC-EPROM             | 27C256, 32Kx8BIT, DIP, 28P, 600MIL  |
| 0401-000005        | D154, D209             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D215, D220             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D221, D222, D223, D224 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D225, D226, D227, D228 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D229, D230, D231, D232 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D233, D401             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D4, D5, D6, D7, D101   | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D500, D501, D502       | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D504, D505             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0402-000012        | D102                   | DIODE-RECTIFIER      | UF4007, 1KV, 1A, DO-41, TP          |
| 0402-000129        | D1, D216, D217         | DIODE-RECTIFIER      | 1N4003, 200V, 1A, DO-41, TP         |
| 0402-000129        | D503                   | DIODE-RECTIFIER      | 1N4003, 200V, 1A, DO-41, TP         |
| 0402-000145        | D103                   | DIODE-RECTIFIER      | 1N4937, 600V, 1A, DO-41, -          |
| 0402-000468        | D205, D206, D207, D208 | DIODE-RECTIFIER      | ESJS58-06, 6KV, 2mA, DO-201         |
| 0402-001193        | D201, D202, D203, D204 | DIODE-RECTIFIER      | SHV-04, 4KV, 20mA, -, TP            |
| 0402-001193        | D210                   | DIODE-RECTIFIER      | SHV-04, 4KV, 20mA, -, TP            |
| 0403-000227        | ZD102                  | DIODE-ZENER          | 1N751A, 5.1V, 5%, 500mW, DO-35, TP  |
| 0403-000338        | ZD103                  | DIODE-ZENER          | UZ27BM, 27V, 25.7-28.0V, 500mW, DO  |
| 0403-000346        | ZD152, ZD204, ZD205    | DIODE-ZENER          | UZ33B, 33V, 30-36V, 500mW, DO-35, T |
| 0403-000356        | ZD151, ZD201           | DIODE-ZENER          | UZ5.6BCB, 5.6V, 5.46-5.7V, 500mW,   |
| 0403-000475        | ZD203                  | DIODE-ZENER          | 1N5274B, 130V, 5%, 500mW, DO-35, TP |
| 0403-000554        | ZD202                  | DIODE-ZENER          | UZ7.5BM, 7.2-7.7V, 500mW, DO-35, T  |
| 0501-000010        | Q211                   | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000010        | Q3, Q4, Q8, Q10, Q208  | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000010        | Q500, Q503             | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000294        | Q207, Q209             | TR-SMALL SIGNAL      | KSA708-Y, PNP, 800mW, TO-92, TP, 12 |
| 0501-000294        | Q501, Q502             | TR-SMALL SIGNAL      | KSA708-Y, PNP, 800mW, TO-92, TP, 12 |
| 1203-000002        | U151                   | IC-POS. ADJUST REG.  | 431, TO-92, 3P, -, PLASTIC, 2.44/2. |
| 2001-000003        | JP122                  | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000003        | R25, R52, R111, R151   | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000003        | R406                   | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |

|  | SEC. Code   | Location No.            | Description | Spec                         |
|--|-------------|-------------------------|-------------|------------------------------|
|  | 2001-000005 | R221, R231              | R-CARBON    | 390OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000010 | R240                    | R-CARBON    | 68KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000012 | R236                    | R-CARBON    | 680KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000015 | R62                     | R-CARBON(S) | 0.5OHM, 5%, 1/2W, AA, TP, -  |
|  | 2001-000016 | R8                      | R-CARBON(S) | 1OHM, 5%, 1/2W, AA, TP, -    |
|  | 2001-000019 | R217, R230              | R-CARBON(S) | 10OHM, 5%, 1/2W, AA, TP, -   |
|  | 2001-000023 | R109                    | R-CARBON    | 47OHM, 5%, 1/4W, AA, TP, -   |
|  | 2001-000027 | R104                    | R-CARBON    | 100OHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000045 | R274                    | R-CARBON    | 1.8KOHM, 5%, 1/4W, AA, TP, - |
|  | 2001-000085 | R106, R107              | R-CARBON(S) | 100KOHM, 5%, 1/2W, AA, TP, - |
|  | 2001-000105 | R14                     | R-CARBON    | 1.5KOHM, 5%, 1/4W, AA, TP, - |
|  | 2001-000118 | R103                    | R-CARBON(S) | 180OHM, 5%, 1/2W, AA, TP, -  |
|  | 2001-000221 | R39                     | R-CARBON    | 1.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000273 | R238                    | R-CARBON    | 100KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000281 | R15, R24, R29, R30, R31 | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R155, R252, R282, R283  | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R284, R285, R293, R422  | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R514                    | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000294 | R205                    | R-CARBON    | 10MOHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000319 | R215                    | R-CARBON    | 120KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000331 | R56, R63                | R-CARBON    | 12KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000362 | R16, R23, R64           | R-CARBON    | 150OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000362 | R512                    | R-CARBON    | 150OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000429 | R18, R33, R34           | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R408                    | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R41, R42, R44, R45, R46 | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R49                     | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000435 | R502                    | R-CARBON    | 1MOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000449 | R48, R225, R250, R256   | R-CARBON    | 2.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000449 | R501, R504              | R-CARBON    | 2.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000515 | R27, R424, R425, R426   | R-CARBON    | 220OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000552 | R112                    | R-CARBON    | 270OHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000563 | R253                    | R-CARBON    | 27KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000565 | R517                    | R-CARBON    | 27OHM, 5%, 1/2W, AA, TP, -   |
|  | 2001-000577 | R152                    | R-CARBON    | 2KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000660 | R249                    | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000660 | R257, R263, R266        | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000660 | R500, R503, R507        | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000734 | R110                    | R-CARBON    | 4.7KOHM, 5%, 1/8W, AA, TP, - |

| SEC. Code   | Location No.            | Description | Spec                                |
|-------------|-------------------------|-------------|-------------------------------------|
| 2001-000734 | R251                    | R-CARBON    | 4.7KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-000761 | R218                    | R-CARBON    | 430OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000780 | R156                    | R-CARBON    | 470OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000786 | R54, R223, R224, R227   | R-CARBON    | 47KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-000812 | R19, R26, R28, R35, R36 | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-000812 | R261, R405              | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-000812 | R38, R40, R51, R59      | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-000812 | R60, R61, R260          | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-000816 | R113                    | R-CARBON    | 5.6OHM, 5%, 1/4W, AA, TP, -         |
| 2001-000832 | R20, R407               | R-CARBON    | 510OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000864 | R53, R248               | R-CARBON    | 56KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-001015 | R262                    | R-CARBON    | 9.1KOHM, 5%, 1/8W, AA, TP, -        |
| 2001-001070 | R102                    | R-CARBON(S) | 120OHM, 5%, 1/2W, AA, TP, -         |
| 2001-001093 | R292                    | R-CARBON(S) | 2.2KOHM, 5%, 1/2W, AA, TP, -        |
| 2001-001119 | R210, R212, R226, R229  | R-CARBON(S) | 3.3MOHM, 5%, 1/2W, AA, TP, -        |
| 2001-001119 | R239                    | R-CARBON(S) | 3.3MOHM, 5%, 1/2W, AA, TP, -        |
| 2001-001150 | R101, R105              | R-CARBON(S) | 470KOHM, 5%, 1/2W, AA, TP, -        |
| 2001-001165 | R216, R219              | R-CARBON(S) | 56OHM, 5%, 1/2W, AA, TP, -          |
| 2004-000002 | R247                    | R-METAL     | 78.7Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-000003 | R237                    | R-METAL     | 16.2Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-000345 | R17, R22, R55, R222     | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm |
| 2004-000345 | R43                     | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm |
| 2004-000345 | R513                    | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm |
| 2004-000385 | R510, R268              | R-METAL     | 17.4Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-000433 | R58, R213               | R-METAL     | 1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-000544 | R508                    | R-METAL     | 21.5Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-000691 | R153                    | R-METAL     | 3.16Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-000699 | R57, R516               | R-METAL     | 3.3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-000754 | R511                    | R-METAL     | 309Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-000869 | R154                    | R-METAL     | 3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-000884 | R37                     | R-METAL     | 4.3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-000900 | R47                     | R-METAL     | 4.7Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-000965 | R243                    | R-METAL     | 470Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-001156 | R509                    | R-METAL     | 619Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m |
| 2004-001231 | R269                    | R-METAL     | 75Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm |
| 2004-001231 | R506                    | R-METAL     | 75Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm |
| 2004-001315 | R234                    | R-METAL     | 86.6Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-001315 | R505                    | R-METAL     | 86.6Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |
| 2004-001357 | R233                    | R-METAL     | 93.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2 |

|  | SEC. Code   | Location No.             | Description           | Spec                                  |
|--|-------------|--------------------------|-----------------------|---------------------------------------|
|  | 2004-001357 | R515                     | R-METAL               | 93.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2   |
|  | 2004-002001 | R245                     | R-METAL               | 12.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2   |
|  | 2004-004179 | R258                     | R-METAL               | 174KOHM, 1%, 1/8W, AA, TP, 1.8X3.2MM  |
|  | 2005-000164 | R114                     | R-WIRE WOUND, NON     | 0.1ohm, 5%, 2W, AA, BK, 4x12mm        |
|  | 2009-001041 | R208, R209               | R-METAL GLAZE         | 2Mohm, 1%, 1/4W, AA, TP, 3X9mm        |
|  | 2009-001042 | R204, R207, R277         | R-METAL GLAZE         | 4.7Mohm, 1%, 1/4W, AA, TP, 3x9mm      |
|  | 2201-000003 | C203                     | C-CERAMIC, DISC       | 68pF, 10%, 2KV, SL, TP, 8x5, 5        |
|  | 2201-000004 | C220                     | C-CERAMIC, DISC       | 100pF, 10%, 2KV, SL, TP, 8x5, 5       |
|  | 2201-000004 | C404                     | C-CERAMIC, DISC       | 100pF, 10%, 2KV, SL, TP, 8x5, 5       |
|  | 2201-000017 | C17, C22, C27, C29       | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000017 | C31, C38, C39, C40, C41  | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000017 | C42, C43, C45, C237      | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000019 | C106, C501               | C-CERAMIC, DISC       | 10nF, +80-20%, 500V, Y5V, TP, 13.5x   |
|  | 2201-000119 | C209                     | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000119 | C222, C226, C227, C229   | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000119 | C26, C32, C34, C37, C46  | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000138 | C16, C28, C30, C402      | C-CERAMIC, DISC       | 100pF, 10%, 50V, Y5P, TP, 4.0X4.0, 2  |
|  | 2201-000162 | C1, C13, C14             | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C19                      | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C217, C231               | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C24, C36                 | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C405                     | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000326 | C221, C223, C225         | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000326 | C230                     | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000326 | C500                     | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000391 | C20, C21                 | C-CERAMIC, DISC       | 22pF, 5%, 50V, SL, TP, 5.0x3.0, 5     |
|  | 2201-000473 | C207, C208, C210, C214   | C-CERAMIC, DISC       | 33nF, +80-20%, 50V, Y5V, TP, 6x3, 5   |
|  | 2201-000473 | C224                     | C-CERAMIC, DISC       | 33nF, +80-20%, 50V, Y5V, TP, 6x3, 5   |
|  | 2201-000645 | C111                     | C-CERAMIC, DISC       | 680pF, 5%, 50V, SL, TP, 10*3, 5       |
|  | 2201-000724 | C201, C204, C219         | C-CERAMIC, DISC       | 470pF, 0.1, 3KV, Y5P, TP, 8x5, 5      |
|  | 2201-000724 | C202, C206               | C-CERAMIC, DISC       | 470pF, 0.1, 3KV, Y5P, TP, 8x5, 5      |
|  | 2202-000002 | C10, C12, C15, C18, C401 | C-CERAMIC, MLC-AXIAL  | 10nF, 0.05, 500V, X7R, TP, 5.1x6.4x   |
|  | 2202-000002 | C502                     | C-CERAMIC, MLC-AXIAL  | 10nF, 0.05, 500V, X7R, TP, 5.1x6.4x   |
|  | 2202-000654 | C110, C112               | C-CERAMIC, MLC-RADIAL | 100nF, 10%, 50V, X7R, TP, 5.1x6.6, 5  |
|  | 2301-000490 | C113, C505               | C-FILM, PEF           | 4.7nF, 5%, 100V, TP, 5.8x3.1x12.5,    |
|  | 2401-000207 | C228, C503, C504, C506   | C-AL                  | 100uF, 20%, 50V, WT, TP, 8x12, 5      |
|  | 2401-000613 | C109, C152               | C-AL                  | 1uF, 20%, 50V, WT, TP, 5x11, 5        |
|  | 2401-001476 | C11                      | C-AL                  | 47uF, 20%, 10V, GP, TP, 6.3x5mm, 2.5  |
|  | 2401-001585 | C114                     | C-AL                  | 47uF, 20%, 50V, WT, TP, 8x11.5, 5     |



| SEC. Code   | Location No.                   | Description       | Spec                               |
|-------------|--------------------------------|-------------------|------------------------------------|
| 2401-001700 | C153, C154, C155               | C-AL              | 470uF, 20%, 10V, -, -, 10x12.5, -  |
| 2401-002075 | C33, C35                       | C-AL              | 4.7uF, 20%, 50V, GP, TP, 5x11, 5   |
| 2902-001011 | BD1, BD101, BD102              | FILTER-LINE       | -, -, -                            |
| 2902-001011 | BD103, BD151, BD152            | FILTER-LINE       | -, -, -                            |
| 3301-000344 | FB1, FB2, FB3, FB4, FB5        | CORE-FERRITE BEAD | ZZ, 3.5x6.5mm, -, -                |
| 3602-000001 | FH1, FH2, FH3, FH4             | FUSE-CLIP         | -, -, 30mohm                       |
| JC39-40511A | JP104, JP105, JP106, JP107,    | CBF HARNESS-      | ML-80, JUMPER, AWG22, 52mm, SILVER |
|             | JP108, JP109, JP110, JP111,    |                   |                                    |
|             | JP112, JP113, JP114, JP115,    |                   |                                    |
|             | JP116, JP117, JP118, JP119,    |                   |                                    |
|             | JP120, JP121, JP123, JP124,    |                   |                                    |
|             | JP125, JP126, JP127, JP128,    |                   |                                    |
|             | JP129, JP130, JP131, JP132,    |                   |                                    |
|             | JP133, JP134, JP135, JP136,    |                   |                                    |
|             | JP137, JP138, JP139, JP140,    |                   |                                    |
|             | JP141, JP142, JP142, JP143,    |                   |                                    |
|             | JP144, JP145, JP146, JP147,    |                   |                                    |
|             | JP148, JP149, JP150, JP151,    |                   |                                    |
|             | JP152, JP153, JP154, JP155,    |                   |                                    |
|             | JP156, JP157, JP158, JP159,    |                   |                                    |
|             | JP160, JP16, JP17, JP21, JP22, |                   |                                    |
|             | JP23, JP161, JP162, JP163,     |                   |                                    |
|             | JP164, JP165, JP166, JP167,    |                   |                                    |
|             | JP168, JP169, JP170, JP173,    |                   |                                    |
|             | JP174, JP175, JP176, JP177,    |                   |                                    |
|             | JP178, JP179, JP180, JP181,    |                   |                                    |
|             | JP182, JP188, JP189, JP190,    |                   |                                    |
|             | JP191, JP192, JP193, JP194,    |                   |                                    |
|             | JP195, JP196, JP197, JP198,    |                   |                                    |
|             | JP199, JP200, JP203, JP187,    |                   |                                    |
|             | JP268, JP204, JP205, JP206,    |                   |                                    |
|             | JP208, JP209, JP210, JP211,    |                   |                                    |
|             | JP212, JP213, JP214, JP217,    |                   |                                    |
|             | JP218, JP219, JP220, JP221,    |                   |                                    |
|             | JP222, JP223, JP224, JP225,    |                   |                                    |
|             | JP226, JP227, JP228, JP229,    |                   |                                    |
|             | JP230, JP231, JP232, JP233,    |                   |                                    |
|             | JP234, JP25, JP26, JP27, JP28, |                   |                                    |
|             | JP272, JP273, JP274, JP275,    |                   |                                    |

|  | SEC. Code   | Location No.                  | Description         | Spec                                 |
|--|-------------|-------------------------------|---------------------|--------------------------------------|
|  | JC39-40511A | JP29, JP30, JP31, JP216,      | CBF HARNESS-        | ML-80, JUMPER, AWG22, 52mm, SILVER   |
|  |             | JP276, JP601, JP33, JP34,     |                     |                                      |
|  |             | JP35, JP36, JP37, JP38, JP39, |                     |                                      |
|  |             | JP40, JP41, JP42, JP43, JP44, |                     |                                      |
|  |             | JP45, JP46, JP47, JP49, JP50, |                     |                                      |
|  |             | JP51, JP52, JP55, JP56, JP57, |                     |                                      |
|  |             | JP58, JP59, JP60, JP62, JP63, |                     |                                      |
|  |             | JP602, JP605, JP616, JP7,     |                     |                                      |
|  |             | JP617, R412, JP65, JP66,      |                     |                                      |
|  |             | JP67, JP68, JP69, JP70, JP71, |                     |                                      |
|  |             | JP72, JP73, JP74, JP75, JP76, |                     |                                      |
|  |             | JP77, JP78, JP79, JP80, JP8,  |                     |                                      |
|  |             | JP10, JP11, JP13, JP81, JP82, |                     |                                      |
|  |             | JP83, JP84, JP85, JP86, JP87, |                     |                                      |
|  |             | JP88, JP89, JP90, JP91, JP92, |                     |                                      |
|  |             | JP93, JP94, JP95, JP96, JP97, |                     |                                      |
|  |             | JP98, JP99, JP100, JP101,     |                     |                                      |
|  |             | JP102, JP103, JS3, JS4, JS5,  |                     |                                      |
|  |             | JP4, JP5, JP6                 |                     |                                      |
|  | JC41-10529A | -                             | PCB-ENGINE          | ML-5500, FR-1, 1L, T1.6, 247X299mm   |
|  | 0402-000104 | DB101                         | DIODE-BRIDGE        | D3SBA60, 600V, 4A, -, ST             |
|  | 0502-000245 | Q9                            | TR-POWER            | KSB1151-Y, PNP, 1.3W, TO-126, -, 16  |
|  | 0502-001124 | Q201, Q202, Q203, Q204        | TR-POWER            | KSD526, NPN, 30W, TO-220, BK, 120-2  |
|  | 0604-000001 | PC152, PC153                  | PHOTO-COUPLER       | TR, 50-60%, 200mW, DIP-4, ST         |
|  | 0604-000146 | PC151                         | PHOTO-COUPLER       | TRIAC, -, 250mW, DIP-6, ST           |
|  | 0604-001033 | OP1, OP2, OP3, OP4            | PHOTO-INTERRUPTER   | TR, -, 150mW, DIP-4, ST              |
|  | 0801-000528 | U4                            | IC-CMOS LOGIC       | 74HCT574, D FLIP-FLOP, DIP, 20P, 3   |
|  | 0801-000722 | U6                            | IC-CMOS LOGIC       | 74HC245, TRANSCEIVER, DIP, 20P, 30   |
|  | 0803-000679 | U205                          | IC-TTL              | 7406, BUFFER/DRIVER, DIP, 14P, 300   |
|  | 0803-001097 | U203                          | IC-TTL              | 7407, BUFFER/DRIVER, DIP, 14P, 300   |
|  | 0903-000219 | U3                            | IC-MICROCOMPUTER    | 88C4316, 8BIT, DIP, 64P, -, 8MHz, ST |
|  | 1201-000229 | U201                          | IC-OP AMP           | 324, DIP, 14P, 300MIL, QUAD, 100V/m  |
|  | 1202-000103 | U5                            | IC-VOLTAGE COMP.    | 393, DIP, 8P, 300MIL, DUAL, 36V, CMO |
|  | 1203-000258 | U202                          | IC-POS.FIXED REG.   | 7818, TO-220, 3P, -, PLASTIC, 17.3/  |
|  | 1203-000531 | U101                          | IC-SWITCH VOL. REG. | 5311, DIP, 8P, 300MIL, PLASTIC, -, 3 |
|  | 1404-000167 | TH101                         | THERMISTOR-NTC      | 5ohm, 10%, 3150K, 18.7mW/C, TP       |
|  | 1405-000147 | TNR101                        | VARISTOR            | 470V, 4500A, 17x12mm, BK             |
|  | 2003-000703 | R157, R158                    | R-METAL OXIDE(S)    | 470ohm, 5%, 3W, AA, TP, 6x16mm       |
|  | 2003-000706 | R108                          | R-METAL OXIDE(S)    | 47Kohm, 5%, 2W, AA, TP, 4.3x12mm     |

| SEC. Code   | Location No.           | Description      | Spec                                 |
|-------------|------------------------|------------------|--------------------------------------|
| 2009-001082 | R280                   | R-METAL GLAZE    | 30Mohm, 2%, 2W, -, BK, 30x8.5mm      |
| 2009-001083 | R220                   | R-METAL GLAZE    | 200Mohm, 2%, 1/2W, CM, BK, 18x6mm    |
| 2009-001084 | R211                   | R-METAL GLAZE    | 30Mohm, 2%, 0.5W, CM, BK, 18x6mm     |
| 2009-001085 | R201                   | R-METAL GLAZE    | 10Mohm, 3%, 1/2W, CM, BK, 18x4mm     |
| 2103-000156 | VR201, VR202, VR204    | VR-SEMI          | 10Kohm, 10%, 1/2W, TOP               |
| 2103-000270 | VR203                  | VR-SEMI          | 20Kohm, 10%, 1/2W, TOP               |
| 2103-001079 | VR205                  | VR-SEMI          | 100Kohm, 15%, 1/2W, TOP              |
| 2201-000023 | C103, C104, C115       | C-CERAMIC, DISC  | 2.2nF, 20%, 125V, Y5U, TP, 11x7, 5   |
| 2201-000154 | C108                   | C-CERAMIC, DISC  | 10nF, +80-20%, 2KV, Y5P, TP, 20x5, 1 |
| 2201-002066 | C211, C212, C215, C216 | C-CERAMIC, DISC  | 470pF, 10%, 6KV, Y5P, TP, 10x7, 10   |
| 2201-002067 | C213                   | C-CERAMIC, DISC  | 100pF, 10%, 6KV, Y5P, TP, 8x7, 10    |
| 2301-000323 | C101                   | C-FILM, PEF      | 220nF, 0.1, 250V, -, -, -            |
| 2305-000002 | C102                   | C-FILM, MPEF     | 47nF, 20%, 250VAC, BK, 18X12.5X5.5   |
| 2401-000183 | C156, C157             | C-AL             | 1000uF, 20%, 35V, WT, TP, 12.5x25, 5 |
| 2401-000697 | C151                   | C-AL             | 2200uF, 20%, 16V, WT, TP, 12.5x25, 5 |
| 2401-003203 | C107                   | C-AL             | 470uF, 20%, 200V, GP, BK, 30X25, 10m |
| 2801-000002 | X1                     | CRYSTAL-UNIT     | 6.94407MHz, 50ppm, 28-AAM, 20pF, 5   |
| 3405-000125 | SW151, SW152           | SWITCH-MICRO     | 125V, 5A, 50gf, SPDT                 |
| 3601-000151 | F151                   | FUSE-FERRULE     | 125V, 5A, NON TIME, GLASS, 5x20mm    |
| 3601-000157 | F101                   | FUSE-FERRULE     | 125V, 8A, SLOW BLOW, GLASS, 5x20mm   |
| 3704-000235 | U2                     | SOCKET-IC        | 28P, DIP, SN, 2.54mm                 |
| 3711-000164 | CN4                    | CONNECTOR-HEADER | 1WALL, 2P, 1R, 2.5mm, STRAIGHT, SN   |
| 3711-000217 | CN101                  | CONNECTOR-HEADER | 1WALL, 3P, 1R, 3.96mm, STRAIGHT, SN  |
| 3711-000633 | CN3                    | CONNECTOR-HEADER | BOX, 11P, 1R, 2mm, STRAIGHT, SN      |
| 3711-000782 | CN105                  | CONNECTOR-HEADER | BOX, 2P, 1R, 2.0mm, STRAIGHT, SN     |
| 3711-000865 | CN103                  | CONNECTOR-HEADER | BOX, 3P, 1R, 2mm, STRAIGHT, SN       |
| 3711-001108 | CN6                    | CONNECTOR-HEADER | BOX, 8P, 1R, 2mm, STRAIGHT, SN       |
| 3711-002104 | CN102                  | CONNECTOR-HEADER | 1WALL, 2P, 1R, 7.92mm, STRAIGHT, SN  |
| 3711-002410 | CN104                  | CONNECTOR-HEADER | BOX, 10P, 2R, 2mm, STRAIGHT, SN      |
| 3711-002653 | CN7                    | CONNECTOR-HEADER | BOX, 3P, 1R, 2.5mm, STRAIGHT, SN     |
| 3711-003204 | CN5                    | CONNECTOR-HEADER | BOX, 24P, 2R, 2mm, STRAIGHT, SN      |
| 3711-003205 | CN2                    | CONNECTOR-HEADER | BOX, 4P, 1R, 2.0mm, STRAIGHT, SN     |
| 3711-003969 | CN8, CN10              | CONNECTOR-HEADER | BOX, 2P, 1R, 2.5mm, STRAIGHT, SN     |
| JC26-20301B | T201                   | TRANS AF-        | ML-80, -, 95MH                       |
| JC26-20301B | T202, T204             | TRANS AF-        | ML-80, -, 95MH                       |
| JC26-20301C | T101                   | TRANS AF-        | ML-80, -, 0.4WIRE                    |
| JC26-30506A | T203                   | TRANS POWER-THV  | ML-7000, -, 57.5/1.3uH, 180mH        |
| JC27-40502A | L103                   | COIL CHOCK-68UH  | ML5500, 68uH, 0.04ohm, 32T           |
| JC27-60101B | L152                   | COIL FILTER-     | -, 9UH, -, -                         |

|  | SEC. Code   | Location No.       | Description          | Spec                                |
|--|-------------|--------------------|----------------------|-------------------------------------|
|  | JC27-60101C | L151               | COIL FILTER-         | -, 6UH, -, -                        |
|  | JC27-60502A | L101               | COIL FILTER-LINE110V | ML5500, 7.0mH, 0.10ohm, 26T         |
|  | JC27-60503A | L102               | COIL FILTER-3MH      | ML5500, 3.0mH, 0.40ohm, 30T         |
|  | JC33-10501B | -                  | SOLENOID-6000        | ML-6000, 24VDC, 72W, 57, 39X39X22,  |
|  | JC70-10909A | HP1, HP2, HP3, HP4 | IPR-CONNECTOR HV     | ML-80, AL, T0.8, -                  |
|  | JC96-00320A | -                  | ELA HOU-H/SINK       | ML-80(SEAU), -, EUROPE, -, -, -, -  |
|  | 0402-000304 | D153               | DIODE-RECTIFIER      | STPR1020CF, 200V, 5A, TO-220, ST    |
|  | 0402-000314 | D152               | DIODE-RECTIFIER      | D10SC4M, 40V, 10A, ITO-220          |
|  | 0502-001124 | Q201, Q203         | TR-POWER             | KSD526, NPN, 30W, TO-220, BK, 120-2 |
|  | 0505-000134 | Q102               | FET-SILICON          | IRF840, N, 500V, 8A, 0.85OHM, 125W, |
|  | TO-220AB    |                    |                      |                                     |
|  | 1401-000108 | Q101               | THYRISTOR-TRIAC      | 100A, 600V, -, 5V/uS, TO-220AB      |
|  | 6003-000008 | Q201, Q101         | SCREW-TAPTITE        | BH, +, S, M3, L4, ZPC3, SWRCH18A    |
|  | 6003-000119 | D152, D153, Q203   | SCREW-TAPTITE        | BH, +, B, M3, L8, CBLACK, SWRCH18A  |
|  | JC61-70100A | FOR SMPS H/SINK    | SPRING-PS            | ML-66G, STS304-W1/2H, T0.5, -, -, - |
|  | JC62-20001A | Q102               | TUBE-IRF840          | SSP5N90, IRF840, -, T0.45, L23, -   |
|  | JC62-30001A | Q102, D152.D153    | HEAT SINK-TRANS      | ML-80, AL, -                        |
|  | JC62-30002A | Q203               | HEAT SINK-SMPS       | ML-80, AL, -                        |
|  | JF62-30201A | Q101, Q201         | HEAT SINK            | HVPS, SPCC, t1.0                    |
|  | JF68-30527H | -                  | LABEL(R)-BAR CODE    | SF1000, PY, 38X6.5, T0.1, WHT       |
|  | JF68-30527N | -                  | LABEL(R)-BAR CODE    | SF500, PY, 20X10, T0.1, WHT         |

**7-1-2. Engine PBA (ML-6050 : 220V)**

| SEC. Code          | Location No.           | Description          | Spec                                |
|--------------------|------------------------|----------------------|-------------------------------------|
| <b>JC92-01051A</b> |                        | <b>ENGINE (220V)</b> |                                     |
| 0201-000008        | -                      | ADHESIVE-HM          | PP_#3748,WHT,6500CPS,-              |
| 1102-000239        | U2                     | IC-EPROM             | 27C256,32Kx8BIT,DIP,28P,600MIL      |
| 0401-000005        | D154,D209              | DIODE-SWITCHING      | 1N4148,75V,200MA,DO-35,TP           |
| 0401-000005        | D215, D220             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D221, D222, D223, D224 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D225, D226, D227, D228 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D229, D230, D231, D232 | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D233, D401             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D4, D5, D6, D7, D101   | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D500, D501, D502       | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0401-000005        | D504, D505             | DIODE-SWITCHING      | 1N4148, 75V, 200MA, DO-35, TP       |
| 0402-000012        | D102                   | DIODE-RECTIFIER      | UF4007, 1KV, 1A, DO-41, TP          |
| 0402-000129        | D1, D216, D217         | DIODE-RECTIFIER      | 1N4003, 200V, 1A, DO-41, TP         |
| 0402-000129        | D503                   | DIODE-RECTIFIER      | 1N4003, 200V, 1A, DO-41, TP         |
| 0402-000145        | D103                   | DIODE-RECTIFIER      | 1N4937, 600V, 1A, DO-41, -          |
| 0402-000468        | D205, D206, D207, D208 | DIODE-RECTIFIER      | ESJS58-06, 6KV, 2mA, DO-201         |
| 0402-001193        | D201, D202, D203, D204 | DIODE-RECTIFIER      | SHV-04, 4KV, 20mA, -, TP            |
| 0402-001193        | D210                   | DIODE-RECTIFIER      | SHV-04, 4KV, 20mA, -, TP            |
| 0403-000227        | ZD102                  | DIODE-ZENER          | 1N751A, 5.1V, 5%, 500mW, DO-35, TP  |
| 0403-000338        | ZD103                  | DIODE-ZENER          | UZ27BM, 27V, 25.7-28.0V, 500mW, DO  |
| 0403-000346        | ZD152, ZD204, ZD205    | DIODE-ZENER          | UZ33B, 33V, 30-36V, 500mW, DO-35, T |
| 0403-000356        | ZD151, ZD201           | DIODE-ZENER          | UZ5.6BCB, 5.6V, 5.46-5.7V, 500mW,   |
| 0403-000475        | ZD101, ZD203           | DIODE-ZENER          | 1N5274B, 130V, 5%, 500mW, DO-35, TP |
| 0403-000554        | ZD202                  | DIODE-ZENER          | UZ7.5BM, 7.2-7.7V, 500mW, DO-35, T  |
| 0501-000010        | Q211                   | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000010        | Q3, Q4, Q8, Q10, Q208  | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000010        | Q500, Q503             | TR-SMALL SIGNAL      | KSC1008, NPN, 800mW, TO-92, TP, 120 |
| 0501-000294        | Q207, Q209             | TR-SMALL SIGNAL      | KSA708-Y, PNP, 800mW, TO-92, TP, 12 |
| 0501-000294        | Q501, Q502             | TR-SMALL SIGNAL      | KSA708-Y, PNP, 800mW, TO-92, TP, 12 |
| 1203-000002        | U151                   | IC-POS. ADJUST REG.  | 431, TO-92, 3P, -, PLASTIC, 2.44/2. |
| 2001-000002        | R107                   | R-CARBON(S)          | 200KOHM, 5%, 1/2W, AA, TP, -        |
| 2001-000003        | JP122                  | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000003        | R25, R52, R111, R151   | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000003        | R406                   | R-CARBON             | 330OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000005        | R221, R231             | R-CARBON             | 390OHM, 5%, 1/8W, AA, TP, -         |
| 2001-000010        | R240                   | R-CARBON             | 68KOHM, 5%, 1/8W, AA, TP, -         |

|  | SEC. Code   | Location No.            | Description | Spec                         |
|--|-------------|-------------------------|-------------|------------------------------|
|  | 2001-000012 | R236                    | R-CARBON    | 680KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000015 | R62                     | R-CARBON(S) | 0.5OHM, 5%, 1/2W, AA, TP, -  |
|  | 2001-000016 | R8                      | R-CARBON(S) | 1OHM, 5%, 1/2W, AA, TP, -    |
|  | 2001-000019 | R217, R230              | R-CARBON(S) | 10OHM, 5%, 1/2W, AA, TP, -   |
|  | 2001-000023 | R109                    | R-CARBON    | 47OHM, 5%, 1/4W, AA, TP, -   |
|  | 2001-000027 | R104                    | R-CARBON    | 100OHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000045 | R274                    | R-CARBON    | 1.8KOHM, 5%, 1/4W, AA, TP, - |
|  | 2001-000105 | R14                     | R-CARBON    | 1.5KOHM, 5%, 1/4W, AA, TP, - |
|  | 2001-000118 | R103                    | R-CARBON(S) | 180OHM, 5%, 1/2W, AA, TP, -  |
|  | 2001-000221 | R39                     | R-CARBON    | 1.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000273 | R238                    | R-CARBON    | 100KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000281 | R15, R24, R29, R30, R31 | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R155, R252, R282, R283  | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R284, R285, R293, R422  | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000281 | R514                    | R-CARBON    | 100OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000294 | R205                    | R-CARBON    | 10MOHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000319 | R215                    | R-CARBON    | 120KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000331 | R56, R63                | R-CARBON    | 12KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000362 | R16, R23, R64           | R-CARBON    | 150OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000362 | R512                    | R-CARBON    | 150OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000429 | R18, R33, R34           | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R408                    | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R41, R42, R44, R45, R46 | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000429 | R49                     | R-CARBON    | 1KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000435 | R502                    | R-CARBON    | 1MOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000449 | R48, R225, R250, R256   | R-CARBON    | 2.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000449 | R501, R504              | R-CARBON    | 2.2KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000515 | R27, R424, R425, R426   | R-CARBON    | 220OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000552 | R112                    | R-CARBON    | 270OHM, 5%, 1/4W, AA, TP, -  |
|  | 2001-000563 | R253                    | R-CARBON    | 27KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000565 | R517                    | R-CARBON    | 27OHM, 5%, 1/2W, AA, TP, -   |
|  | 2001-000577 | R152                    | R-CARBON    | 2KOHM, 5%, 1/8W, AA, TP, -   |
|  | 2001-000660 | R249                    | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000660 | R257, R263, R266        | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000660 | R500, R503, R507        | R-CARBON    | 33KOHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000734 | R110                    | R-CARBON    | 4.7KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000734 | R251                    | R-CARBON    | 4.7KOHM, 5%, 1/8W, AA, TP, - |
|  | 2001-000761 | R218                    | R-CARBON    | 430OHM, 5%, 1/8W, AA, TP, -  |
|  | 2001-000780 | R156                    | R-CARBON    | 470OHM, 5%, 1/8W, AA, TP, -  |

| SEC. Code   | Location No.            | Description | Spec                                 |
|-------------|-------------------------|-------------|--------------------------------------|
| 2001-000786 | R54, R223, R224, R227   | R-CARBON    | 47KOHM, 5%, 1/8W, AA, TP, -          |
| 2001-000812 | R19, R26, R28, R35, R36 | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-000812 | R261, R405              | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-000812 | R38, R40, R51, R59      | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-000812 | R60, R61, R260          | R-CARBON    | 5.6KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-000816 | R113                    | R-CARBON    | 5.6OHM, 5%, 1/4W, AA, TP, -          |
| 2001-000832 | R20, R407               | R-CARBON    | 510OHM, 5%, 1/8W, AA, TP, -          |
| 2001-000864 | R53, R248               | R-CARBON    | 56KOHM, 5%, 1/8W, AA, TP, -          |
| 2001-001015 | R262                    | R-CARBON    | 9.1KOHM, 5%, 1/8W, AA, TP, -         |
| 2001-001070 | R102                    | R-CARBON(S) | 120OHM, 5%, 1/2W, AA, TP, -          |
| 2001-001093 | R292                    | R-CARBON(S) | 2.2KOHM, 5%, 1/2W, AA, TP, -         |
| 2001-001119 | R210, R212, R226, R229  | R-CARBON(S) | 3.3MOHM, 5%, 1/2W, AA, TP, -         |
| 2001-001119 | R239                    | R-CARBON(S) | 3.3MOHM, 5%, 1/2W, AA, TP, -         |
| 2001-001150 | R101, R105              | R-CARBON(S) | 470KOHM, 5%, 1/2W, AA, TP, -         |
| 2001-001165 | R216, R219              | R-CARBON(S) | 56OHM, 5%, 1/2W, AA, TP, -           |
| 2004-000002 | R247                    | R-METAL     | 78.7Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-000003 | R237                    | R-METAL     | 16.2Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-000345 | R17, R22, R55, R222     | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-000345 | R43                     | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-000345 | R513                    | R-METAL     | 15Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-000385 | R510, R268              | R-METAL     | 17.4Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-000433 | R58, R213               | R-METAL     | 1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm   |
| 2004-000544 | R508                    | R-METAL     | 21.5Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-000691 | R153                    | R-METAL     | 3.16Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-000699 | R516, R57               | R-METAL     | 3.3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-000754 | R511                    | R-METAL     | 309Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-000869 | R154                    | R-METAL     | 3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm   |
| 2004-000884 | R37                     | R-METAL     | 4.3Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-000900 | R47                     | R-METAL     | 4.7Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-000965 | R243                    | R-METAL     | 470Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-001156 | R509                    | R-METAL     | 619Kohm, 1%, 1/8W, AA, TP, 1.8x3.2m  |
| 2004-001231 | R269                    | R-METAL     | 75Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-001231 | R506                    | R-METAL     | 75Kohm, 1%, 1/8W, AA, TP, 1.8x3.2mm  |
| 2004-001315 | R234                    | R-METAL     | 86.6Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-001315 | R505                    | R-METAL     | 86.6Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-001357 | R233                    | R-METAL     | 93.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-001357 | R515                    | R-METAL     | 93.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-002001 | R245                    | R-METAL     | 12.1Kohm, 1%, 1/8W, AA, TP, 1.8x3.2  |
| 2004-004179 | R258                    | R-METAL     | 174KOHM, 1%, 1/8W, AA, TP, 1.8X3.2MM |

|  | SEC. Code   | Location No.             | Description           | Spec                                  |
|--|-------------|--------------------------|-----------------------|---------------------------------------|
|  | 2005-000168 | R114                     | R-WIRE WOUND, NON     | 0.22ohm, 5%, 2W, AA, BK, 4x12mm       |
|  | 2009-001041 | R208, R209               | R-METAL GLAZE         | 2Mohm, 1%, 1/4W, AA, TP, 3X9mm        |
|  | 2009-001042 | R204, R207, R277         | R-METAL GLAZE         | 4.7Mohm, 1%, 1/4W, AA, TP, 3x9mm      |
|  | 2201-000003 | C203                     | C-CERAMIC, DISC       | 68pF, 10%, 2KV, SL, TP, 8x5, 5        |
|  | 2201-000004 | C220                     | C-CERAMIC, DISC       | 100pF, 10%, 2KV, SL, TP, 8x5, 5       |
|  | 2201-000004 | C404                     | C-CERAMIC, DISC       | 100pF, 10%, 2KV, SL, TP, 8x5, 5       |
|  | 2201-000017 | C17, C22, C27, C29       | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000017 | C31, C38, C39, C40, C41  | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000017 | C42, C43, C45, C237      | C-CERAMIC, DISC       | 1nF, 10%, 50V, Y5P, TP, 4x3.5, 5      |
|  | 2201-000019 | C106, C501               | C-CERAMIC, DISC       | 10nF, +80-20%, 500V, Y5V, TP, 13.5x   |
|  | 2201-000119 | C209                     | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000119 | C222, C226, C227, C229   | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000119 | C26, C32, C34, C37, C46  | C-CERAMIC, DISC       | 100nF, +80-20%, 50V, Y5V, TP, 8x3.5   |
|  | 2201-000138 | C16, C28, C30, C402      | C-CERAMIC, DISC       | 100pF, 10%, 50V, Y5P, TP, 4.0X4.0, 2  |
|  | 2201-000162 | C1, C13, C14             | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C19                      | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C217, C231               | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C24, C36                 | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000162 | C405                     | C-CERAMIC, DISC       | 10NF, +80-20%, 50V, Y5V, TP, 6.3X3, 5 |
|  | 2201-000326 | C221, C223, C225         | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000326 | C230                     | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000326 | C500                     | C-CERAMIC, DISC       | 2.2nF, 10%, 50V, Y5P, TP, 6.5x3, 5    |
|  | 2201-000391 | C20, C21                 | C-CERAMIC, DISC       | 22pF, 5%, 50V, SL, TP, 5.0x3.0, 5     |
|  | 2201-000473 | C207, C208, C210, C214   | C-CERAMIC, DISC       | 33nF, +80-20%, 50V, Y5V, TP, 6x3, 5   |
|  | 2201-000473 | C224                     | C-CERAMIC, DISC       | 33nF, +80-20%, 50V, Y5V, TP, 6x3, 5   |
|  | 2201-000645 | C111                     | C-CERAMIC, DISC       | 680pF, 5%, 50V, SL, TP, 10*3, 5       |
|  | 2201-000724 | C201, C204, C219         | C-CERAMIC, DISC       | 470pF, 0.1, 3KV, Y5P, TP, 8x5, 5      |
|  | 2201-000724 | C202, C206               | C-CERAMIC, DISC       | 470pF, 0.1, 3KV, Y5P, TP, 8x5, 5      |
|  | 2202-000002 | C10, C12, C15, C18, C401 | C-CERAMIC, MLC-AXIAL  | 10nF, 0.05, 500V, X7R, TP, 5.1x6.4x   |
|  | 2202-000002 | C502                     | C-CERAMIC, MLC-AXIAL  | 10nF, 0.05, 500V, X7R, TP, 5.1x6.4x   |
|  | 2202-000654 | C110, C112               | C-CERAMIC, MLC-RADIAL | 100nF, 10%, 50V, X7R, TP, 5.1x6.6, 5  |
|  | 2301-000490 | C113, C505               | C-FILM, PEF           | 4.7nF, 5%, 100V, TP, 5.8x3.1x12.5,    |
|  | 2401-000207 | C228, C503, C504, C506   | C-AL                  | 100uF, 20%, 50V, WT, TP, 8x12, 5      |
|  | 2401-000613 | C109, C152               | C-AL                  | 1uF, 20%, 50V, WT, TP, 5x11, 5        |
|  | 2401-001476 | C11                      | C-AL                  | 47uF, 20%, 10V, GP, TP, 6.3x5mm, 2.5  |
|  | 2401-001585 | C114                     | C-AL                  | 47uF, 20%, 50V, WT, TP, 8x11.5, 5     |
|  | 2401-001700 | C153, C154, C155         | C-AL                  | 470uF, 20%, 10V, -, -, 10x12.5, -     |
|  | 2401-002075 | C33, C35                 | C-AL                  | 4.7uF, 20%, 50V, GP, TP, 5x11, 5      |
|  | 2902-001011 | BD1, BD101, BD102        | FILTER-LINE           | - , - , -                             |



| SEC. Code   | Location No.                   | Description       | Spec                               |
|-------------|--------------------------------|-------------------|------------------------------------|
| 2902-001011 | BD103, BD151, BD152            | FILTER-LINE       | -, -, -                            |
| 3301-000344 | FB1, FB2, FB3, FB4, FB5        | CORE-FERRITE BEAD | ZZ, 3.5x6.5mm, -, -                |
| 3602-000001 | FH1, FH2, FH3, FH4             | FUSE-CLIP         | -, -, 30mohm                       |
| JC39-40511A | JP104, JP105, JP106, JP107,    | CBF HARNESS-      | ML-80, JUMPER, AWG22, 52mm, SILVER |
|             | JP108, JP109, JP110, JP111,    |                   |                                    |
|             | JP112, JP113, JP114, JP115,    |                   |                                    |
|             | JP116, JP117, JP118, JP119,    |                   |                                    |
|             | JP120, JP121, JP123, JP124,    |                   |                                    |
|             | JP125, JP126, JP127, JP128,    |                   |                                    |
|             | JP129, JP130, JP131, JP132,    |                   |                                    |
|             | JP133, JP134, JP135, JP136,    |                   |                                    |
|             | JP137, JP138, JP139, JP140,    |                   |                                    |
|             | JP141, JP142, JP142, JP143,    |                   |                                    |
|             | JP144, JP145, JP146, JP147,    |                   |                                    |
|             | JP148, JP149, JP150, JP151,    |                   |                                    |
|             | JP152, JP153, JP154, JP155,    |                   |                                    |
|             | JP156, JP157, JP158, JP159,    |                   |                                    |
|             | JP160, JP16, JP17, JP21, JP22, |                   |                                    |
|             | JP23, JP161, JP162, JP163,     |                   |                                    |
|             | JP164, JP165, JP166, JP167,    |                   |                                    |
|             | JP168, JP169, JP170, JP171,    |                   |                                    |
|             | JP172, JP173, JP174, JP175,    |                   |                                    |
|             | JP176, JP177, JP178, JP179,    |                   |                                    |
|             | JP180, JP181, JP182, JP188,    |                   |                                    |
|             | JP189, JP190, JP191, JP192,    |                   |                                    |
|             | JP193, JP194, JP195, JP196,    |                   |                                    |
|             | JP197, JP198, JP199, JP200,    |                   |                                    |
|             | JP203, JP187, JP268, JP204,    |                   |                                    |
|             | JP205, JP206, JP208, JP209,    |                   |                                    |
|             | JP210, JP211, JP212, JP213,    |                   |                                    |
|             | JP214, JP217, JP218, JP219,    |                   |                                    |
|             | JP220, JP221, JP222, JP223,    |                   |                                    |
|             | JP224, JP225, JP226, JP227,    |                   |                                    |
|             | JP228, JP229, JP230, JP231,    |                   |                                    |
|             | JP232, JP233, JP234, JP25,     |                   |                                    |
|             | JP26, JP27, JP28, JP29, JP30,  |                   |                                    |
|             | JP31, JP216, JP272, JP273,     |                   |                                    |
|             | JP274, JP275, JP276, JP601,    |                   |                                    |
|             | JP38, JP39, JP40, JP41, JP42,  |                   |                                    |

|  | SEC. Code   | Location No.                   | Description         | Spec                                 |
|--|-------------|--------------------------------|---------------------|--------------------------------------|
|  | JC39-40511A | JP33, JP34, JP35, JP36, JP37,  | CBF HARNESS-        | ML-80, JUMPER, AWG22, 52mm, SILVER   |
|  |             | JP43, JP44, JP45, JP46, JP47,  |                     |                                      |
|  |             | JP49, JP50, JP51, JP52, JP55,  |                     |                                      |
|  |             | JP56, JP57, JP58, JP59, JP60,  |                     |                                      |
|  |             | JP62, JP63, JP602, JP605,      |                     |                                      |
|  |             | JP616, JP7, JP617, R412,       |                     |                                      |
|  |             | JP65, JP66, JP67, JP68, JP69,  |                     |                                      |
|  |             | JP70, JP71, JP72, JP73, JP74,  |                     |                                      |
|  |             | JP75, JP76, JP77, JP78, JP79,  |                     |                                      |
|  |             | JP80, JP8, JP10, JP11, JP13,   |                     |                                      |
|  |             | JP81, JP82, JP83, JP84, JP85,  |                     |                                      |
|  |             | JP86, JP87, JP88, JP89, JP90,  |                     |                                      |
|  |             | JP91, JP92, JP93, JP94, JP95,  |                     |                                      |
|  |             | JP96, JP97, JP98, JP99, JP100, |                     |                                      |
|  |             | JP101, JP102, JP103, JS3, JS4, |                     |                                      |
|  |             | JS5, JP4, JP5, JP6             |                     |                                      |
|  | JC41-10529A | -                              | PCB-ENGINE          | ML-5500, FR-1, 1L, T1.6, 247X299mm   |
|  | 0402-000104 | DB101                          | DIODE-BRIDGE        | D3SBA60, 600V, 4A, -, ST             |
|  | 0502-000245 | Q9                             | TR-POWER            | KSB1151-Y, PNP, 1.3W, TO-126, -, 16  |
|  | 0502-001124 | Q201, Q202, Q203, Q204         | TR-POWER            | KSD526, NPN, 30W, TO-220, BK, 120-2  |
|  | 0604-000142 | PC152, PC153                   | PHOTO-COUPLER       | TR, -, 200mW, DIP-4, ST              |
|  | 0604-000146 | PC151                          | PHOTO-COUPLER       | TRIAC, -, 250mW, DIP-6, ST           |
|  | 0604-001033 | OP1, OP2, OP3, OP4             | PHOTO-INTERRUPTER   | TR, -, 150mW, DIP-4, ST              |
|  | 0801-000528 | U4                             | IC-CMOS LOGIC       | 74HCT574, D FLIP-FLOP, DIP, 20P, 3   |
|  | 0801-000722 | U6                             | IC-CMOS LOGIC       | 74HC245, TRANSCEIVER, DIP, 20P, 30   |
|  | 0803-000679 | U205                           | IC-TTL              | 7406, BUFFER/DRIVER, DIP, 14P, 300   |
|  | 0803-001097 | U203                           | IC-TTL              | 7407, BUFFER/DRIVER, DIP, 14P, 300   |
|  | 0903-000219 | U3                             | IC-MICROCOMPUTER    | 88C4316, 8BIT, DIP, 64P, -, 8MHz, ST |
|  | 1201-000229 | U201                           | IC-OP AMP           | 324, DIP, 14P, 300MIL, QUAD, 100V/m  |
|  | 1202-000103 | U5                             | IC-VOLTAGE COMP.    | 393, DIP, 8P, 300MIL, DUAL, 36V, CMO |
|  | 1203-000258 | U202                           | IC-POS.FIXED REG.   | 7818, TO-220, 3P, -, PLASTIC, 17.3/  |
|  | 1203-000531 | U101                           | IC-SWITCH VOL. REG. | 5311, DIP, 8P, 300MIL, PLASTIC, -, 3 |
|  | 1404-000167 | TH101                          | THERMISTOR-NTC      | 5ohm, 10%, 3150K, 18.7mW/C, TP       |
|  | 1405-000147 | TNR101                         | VARISTOR            | 470V, 4500A, 17x12mm, BK             |
|  | 2003-000703 | R157, R158                     | R-METAL OXIDE(S)    | 470ohm, 5%, 3W, AA, TP, 6x16mm       |
|  | 2003-000706 | R108                           | R-METAL OXIDE(S)    | 47Kohm, 5%, 2W, AA, TP, 4.3x12mm     |
|  | 2009-001082 | R280                           | R-METAL GLAZE       | 30Mohm, 2%, 2W, -, BK, 30x8.5mm      |
|  | 2009-001083 | R220                           | R-METAL GLAZE       | 200Mohm, 2%, 1/2W, CM, BK, 18x6mm    |
|  | 2009-001084 | R211                           | R-METAL GLAZE       | 30Mohm, 2%, 0.5W, CM, BK, 18x6mm     |

| SEC. Code   | Location No.           | Description          | Spec                                 |
|-------------|------------------------|----------------------|--------------------------------------|
| 2009-001085 | R201                   | R-METAL GLAZE        | 10Mohm, 3%, 1/2W, CM, BK, 18x4mm     |
| 2103-000156 | VR201, VR202, VR204    | VR-SEMI              | 10Kohm, 10%, 1/2W, TOP               |
| 2103-000270 | VR203                  | VR-SEMI              | 20Kohm, 10%, 1/2W, TOP               |
| 2103-001079 | VR205                  | VR-SEMI              | 100Kohm, 15%, 1/2W, TOP              |
| 2201-000023 | C103, C104, C115       | C-CERAMIC, DISC      | 2.2nF, 20%, 125V, Y5U, TP, 11x7, 5   |
| 2201-000154 | C108                   | C-CERAMIC, DISC      | 10nF, +80-20%, 2KV, Y5P, TP, 20x5, 1 |
| 2201-002066 | C211, C212, C215, C216 | C-CERAMIC, DISC      | 470pF, 10%, 6KV, Y5P, TP, 10x7, 10   |
| 2201-002067 | C213                   | C-CERAMIC, DISC      | 100pF, 10%, 6KV, Y5P, TP, 8x7, 10    |
| 2306-000114 | C102                   | C-FILM, MPPF         | 100nF, 20%, 250VAC, BK, 18x7.5mm, 1  |
| 2401-000183 | C156, C157             | C-AL                 | 1000uF, 20%, 35V, WT, TP, 12.5x25, 5 |
| 2401-000697 | C151                   | C-AL                 | 2200uF, 20%, 16V, WT, TP, 12.5x25, 5 |
| 2401-001691 | C107                   | C-AL                 | 150uF, 20%, 400V, WT, BK, 30x25, 10  |
| 2501-000203 | C101                   | C-PAPER              | 470nF, 0.2, 250VAC, TP, 26x11mm, 22  |
| 2801-000002 | X1                     | CRYSTAL-UNIT         | 6.94407MHz, 50ppm, 28-AAM, 20pF, 5   |
| 3405-000125 | SW151, SW152           | SWITCH-MICRO         | 125V, 5A, 50gf, SPDT                 |
| 3601-000003 | F151                   | FUSE-FERRULE         | 250V, 5A, FAST ACTING, GLASS, 20x5   |
| 3601-000296 | F101                   | FUSE-FERRULE         | 250V, 5A, TIME LAG, CERAMIC, 5x20mm  |
| 3704-000235 | U2                     | SOCKET-IC            | 28P, DIP, SN, 2.54mm                 |
| 3711-000164 | CN4                    | CONNECTOR-HEADER     | 1WALL, 2P, 1R, 2.5mm, STRAIGHT, SN   |
| 3711-000217 | CN101                  | CONNECTOR-HEADER     | 1WALL, 3P, 1R, 3.96mm, STRAIGHT, SN  |
| 3711-000633 | CN3                    | CONNECTOR-HEADER     | BOX, 11P, 1R, 2mm, STRAIGHT, SN      |
| 3711-000782 | CN105                  | CONNECTOR-HEADER     | BOX, 2P, 1R, 2.0mm, STRAIGHT, SN     |
| 3711-000865 | CN103                  | CONNECTOR-HEADER     | BOX, 3P, 1R, 2mm, STRAIGHT, SN       |
| 3711-001108 | CN6                    | CONNECTOR-HEADER     | BOX, 8P, 1R, 2mm, STRAIGHT, SN       |
| 3711-002104 | CN102                  | CONNECTOR-HEADER     | 1WALL, 2P, 1R, 7.92mm, STRAIGHT, SN  |
| 3711-002410 | CN104                  | CONNECTOR-HEADER     | BOX, 10P, 2R, 2mm, STRAIGHT, SN      |
| 3711-002653 | CN7                    | CONNECTOR-HEADER     | BOX, 3P, 1R, 2.5mm, STRAIGHT, SN     |
| 3711-003204 | CN5                    | CONNECTOR-HEADER     | BOX, 24P, 2R, 2mm, STRAIGHT, SN      |
| 3711-003205 | CN2                    | CONNECTOR-HEADER     | BOX, 4P, 1R, 2.0mm, STRAIGHT, SN     |
| 3711-003969 | CN8, CN10              | CONNECTOR-HEADER     | BOX, 2P, 1R, 2.5mm, STRAIGHT, SN     |
| JC26-20301B | T201                   | TRANS AF-            | ML-80, -, 95MH                       |
| JC26-20301B | T202, T204             | TRANS AF-            | ML-80, -, 95MH                       |
| JC26-20301D | T101                   | TRANS AF-            | ML-80, -, 0.32WIRE                   |
| JC26-30506A | T203                   | TRANS POWER-THV      | ML-7000, -, 57.5/1.3uH, 180mH        |
| JC27-40502A | L103                   | COIL CHOCK-68UH      | ML5500, 68uH, 0.04ohm, 32T           |
| JC27-60101B | L152                   | COIL FILTER-         | -, 9UH, -, -                         |
| JC27-60101C | L151                   | COIL FILTER-         | -, 6UH, -, -                         |
| JC27-60501A | L101                   | COIL FILTER-LINE220V | ML5500, 13.0mH, 0.10ohm, -           |
| JC27-60503A | L102                   | COIL FILTER-3MH      | ML5500, 3.0mH, 0.40ohm, 30T          |

|  | SEC. Code   | Location No.       | Description       | Spec                                |
|--|-------------|--------------------|-------------------|-------------------------------------|
|  | JC33-10501B | -                  | SOLENOID-6000     | ML-6000, 24VDC, 72W, 57, 39X39X22,  |
|  | JC70-10909A | HP1, HP2, HP3, HP4 | IPR-CONNECTOR HV  | ML-80, AL, T0.8, -                  |
|  | JC96-00319A | -                  | ELA HOU-H/SINK    | ML-80(SEA), -, USA, -, -, -, -      |
|  | 0402-000304 | D153               | DIODE-RECTIFIER   | STPR1020CF, 200V, 5A, TO-220, ST    |
|  | 0402-000314 | D152               | DIODE-RECTIFIER   | D10SC4M, 40V, 10A, ITO-220          |
|  | 0502-001124 | Q201, Q203         | TR-POWER          | KSD526, NPN, 30W, TO-220, BK, 120-2 |
|  | 0505-000173 | Q102               | FET-SILICON       | SSP5N90, N, 900V, 5A, 2.5ohm, 150W, |
|  | 1401-000108 | Q101               | THYRISTOR-TRIAC   | 100A, 600V, -, 5V/uS, TO-220AB      |
|  | 6003-000008 | Q201, Q101         | SCREW-TAPTITE     | BH, +, S, M3, L4, ZPC3, SWRCH18A    |
|  | 6003-000119 | D152, D153, Q203   | SCREW-TAPTITE     | BH, +, B, M3, L8, CBLACK, SWRCH18A  |
|  | JC61-70100A | SMPS H/SINK        | SPRING-PS         | ML-66G, STS304-W1/2H, T0.5, -, -, - |
|  | JC62-20001A | Q102               | TUBE-IRF840       | SSP5N90, IRF840, -, T0.45, L23, -   |
|  | JC62-30001A | Q102, D152, D153   | HEAT SINK-TRANS   | ML-80, AL, -                        |
|  | JC62-30002A | Q203               | HEAT SINK-SMPS    | ML-80, AL, -                        |
|  | JF62-30201A | Q101, Q201         | HEAT SINK         | HVPS, SPCC, t1.0                    |
|  | JF68-30527H | -                  | LABEL(R)-BAR CODE | SF1000, PY, 38X6.5, T0.1, WHT       |
|  | JF68-30527N | -                  | LABEL(R)-BAR CODE | SF500, PY, 20X10, T0.1, WHT         |

## 7-2. Controller Board Parts Lists

### 7-2-1. Controller Board (Not for XEU)

| SEC. Code          | Location No.                 | Description         | Spec                                    |
|--------------------|------------------------------|---------------------|---|
| <b>JC92-01089A</b> |                              | <b>Controller</b>   |   |
| 0803-000117        | U35                          | IC-TTL              | 74F14, INVERTER, SOP, 14P, 150MIL,      |
| 0803-000207        | U36                          | IC-TTL              | 74F08, AND GATE, SOP, 14P, 150MIL,      |
| 0803-000274        | U34                          | IC-TTL              | 74F32, OR GATE, SOP, 14P, 150MIL, Q     |
| 0803-003058        | U33                          | IC-TTL              | 74F1071, ESD, SOP, 20P, -, -, TP, PLA   |
| 0903-001126        | U1                           | IC-MICROCONTROLLER  | 32C6100, 32BIT, QFP, 208P, -, 33MHz     |
| 1103-000133        | U12                          | IC-EEPROM           | 93C66, 256x16BIT, SOP, 8P, 150MIL,      |
| 1105-000191        | U3, U4                       | IC-DRAM             | 416C120, -, -, -, -, 70nS, 5V, -, -, 0t |
| 1107-001077        | U31, U32                     | IC-FLASH MEMORY     | 29F800, 512Kx16BIT, SOP, 44P, 512M      |
| 1203-000346        | U30                          | IC-VOL. SUPERVISORY | 7705, SOP, 8P, 150MIL, PLASTIC, 20V     |
| 2007-000029        | R290, R291, R185, R186, R175 | R-CHIP              | 00HM, 5%, 1/10W, DA, TP, 2012           |
| 2007-000029        | R99, R122, R123, R124, R159  | R-CHIP              | 00HM, 5%, 1/10W, DA, TP, 2012           |
| 2007-000290        | R125, R273, R274, R275,      | R-CHIP              | 100OHM, 5%, 1/10W, DA, TP, 2012         |
|                    | R276, R277, R278             |                     |   |
| 2007-000300        | R139, R267, R268, R269,      | R-CHIP              | 10KOHM, 5%, 1/10W, DA, TP, 2012         |
| 2007-000300        | R270, R271, R272, R298, R43, | R-CHIP              | 10KOHM, 5%, 1/10W, DA, TP, 2012         |
| 2007-000300        | R44, R45, R46, R133, R134    | R-CHIP              | 10KOHM, 5%, 1/10W, DA, TP, 2012         |
| 2007-000308        | R34, R35, R55, R56, R57, R58 | R-CHIP              | 10OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000308        | R66, R67, R68, R69, R70, R71 | R-CHIP              | 10OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000308        | R72, R73, R74, R75, R76, R77 | R-CHIP              | 10OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000308        | R79, R80, R83, R131, R132,   | R-CHIP              | 10OHM, 5%, 1/10W, DA, TP, 2012          |
|                    | R143                         |                     |   |
| 2007-000449        | R120                         | R-CHIP              | 180OHM, 5%, 1/10W, DA, TP, 2012         |
| 2007-000468        | R104, R105, R106, R107,      | R-CHIP              | 1KOHM, 5%, 1/10W, DA, TP, 2012          |
|                    | R108, R114, R115, R116,      |                     |   |
|                    | R130, R140, R149, R53, R97,  |                     |   |
|                    | R98, R101, R102, R103        |                     |   |
| 2007-000493        | R129                         | R-CHIP              | 2.2KOHM, 5%, 1/10W, DA, TP, 2012        |
| 2007-000686        | R265, R266                   | R-CHIP              | 3.3KOHM, 5%, 1/10W, DA, TP, 2012        |
| 2007-000781        | R150, R153, R154, R144       | R-CHIP              | 33OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000781        | R36, R37, R38, R39, R40, R59 | R-CHIP              | 33OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000781        | R87, R88, R89, R90, R91, R92 | R-CHIP              | 33OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000781        | R93, R94, R127, R128, R142,  | R-CHIP              | 33OHM, 5%, 1/10W, DA, TP, 2012          |
| 2007-000931        | R42                          | R-CHIP              | 470OHM, 5%, 1/10W, DA, TP, 2012         |
| 2007-000964        | R109, R110, R111, R112,      | R-CHIP              | 5.1KOHM, 5%, 1/10W, DA, TP, 2012        |

|  | SEC. Code   | Location No.                | Description     | Spec                                |
|--|-------------|-----------------------------|-----------------|-------------------------------------|
|  | 2007-000964 | R113, R264                  | R-CHIP          | 5.1KOHM, 5%, 1/10W, DA, TP, 2012    |
|  | 2007-001133 | R33, R84, R126              | R-CHIP          | 68OHM, 5%, 1/10W, DA, TP, 2012      |
|  | 2011-001094 | RA1, RA2, RA3, RA4, RA5,    | R-NETWORK       | 39ohm, 5%, 1/16W, L, CHIP, 8P, TP   |
|  |             | RA6                         |                 |                                     |
|  | 2011-001094 | RA13, RA14                  | R-NETWORK       | 39ohm, 5%, 1/16W, L, CHIP, 8P, TP   |
|  | 2011-001094 | RA7, RA8, RA9, RA10,        | R-NETWORK       | 39ohm, 5%, 1/16W, L, CHIP, 8P, TP   |
|  |             | RA11, RA12                  |                 |                                     |
|  | 2203-000192 | C12, C13, C14, C15, C16     | C-CERAMIC, CHIP | 100nF, +80-20%, 50V, Y5V, TP, 2012, |
|  | 2203-000192 | C160, C177, C181, C182,     | C-CERAMIC, CHIP | 100nF, +80-20%, 50V, Y5V, TP, 2012, |
|  |             | C183, C184, C17, C18, C19,  |                 |                                     |
|  |             | C20, C21, C22, C185, C186,  |                 |                                     |
|  |             | C187, C188, C189, C192,     |                 |                                     |
|  |             | C23, C24, C25, C32, C33,    |                 |                                     |
|  |             | C34, C35, C36, C37, C42,    |                 |                                     |
|  |             | C46, C47, C355, C6, C7, C8, |                 |                                     |
|  |             | C9, C10, C11                |                 |                                     |
|  | 2203-000239 | C128, C129, C130, C163,     | C-CERAMIC, CHIP | 100pF, 5%, 50V, NPO, TP, 2012, -    |
|  |             | C164, C168, C169, C170,     |                 |                                     |
|  |             | C171, C172, C173, C174,     |                 |                                     |
|  |             | C175, C176, C178, C179,     |                 |                                     |
|  |             | C180, C320                  |                 |                                     |
|  | 2203-000260 | C161                        | C-CERAMIC, CHIP | 10nF, 10%, 50V, X7R, TP, 2012, -    |
|  | 2203-000429 | C51, C52, C53, C54, C55,    | C-CERAMIC, CHIP | 18pF, 5%, 50V, NPO, TP, 2012, -     |
|  |             | C56, C57, C58, C59, C60,    |                 |                                     |
|  |             | C61, C62, C63, C64, C65,    |                 |                                     |
|  |             | C66, C67, C68, C69, C70,    |                 |                                     |
|  |             | C71, C72, C73, C74, C75,    |                 |                                     |
|  |             | C76, C77, C78, C79, C80,    |                 |                                     |
|  |             | C81, C82, C83, C84, C85,    |                 |                                     |
|  |             | C167                        |                 |                                     |
|  | 2203-000444 | C139, C144, C145, C146,     | C-CERAMIC, CHIP | 1nF, 10%, 50V, X7R, TP, 2012, -     |
|  |             | C147, C359                  |                 |                                     |
|  | 2203-000455 | C348, C349, C350, C351,     | C-CERAMIC, CHIP | 1nF, 5%, 50V, NPO, TP, 2012, -      |
|  |             | C352                        |                 |                                     |
|  | 2203-000595 | C301                        | C-CERAMIC, CHIP | 220pF, 5%, 50V, NPO, TP, 2012, -    |
|  | 2203-000634 | C108, C109, C110, C111,     | C-CERAMIC, CHIP | 22pF, 5%, 50V, NPO, TP, 2012, -     |
|  |             | C112, C120, C157, C158,     |                 |                                     |
|  |             | C165, C166, C190            |                 |                                     |
|  | 2203-000938 | C341, C342, C343, C344,     | C-CERAMIC, CHIP | 470pF, 5%, 50V, NPO, TP, 2012, -    |

| SEC. Code   | Location No.             | Description           | Spec                                |
|-------------|--------------------------|-----------------------|-------------------------------------|
| 2203-000938 | C345, C346, C347         | C-CERAMIC, CHIP       | 470pF, 5%, 50V, NPO, TP, 2012, -    |
| 2203-001002 | C104, C105, C107, C113   | C-CERAMIC, CHIP       | 47pF, 5%, 50V, NPO, TP, 2012, -     |
| 2203-001158 | C48, C50                 | C-CERAMIC, CHIP       | 68pF, 5%, 50V, NPO, TP, 2012, -     |
| 2404-000128 | C162                     | C-TA, CHIP            | 10uF, 20%, 16V, -, TP, 6032, -      |
| 2404-000308 | C1, C2, C3, C191         | C-TA, CHIP            | 33uF, 20%, 10V, -, TP, 7342, 4.4mm  |
| 2404-000308 | C340                     | C-TA, CHIP            | 33uF, 20%, 10V, -, TP, 7342, 4.4mm  |
| 2804-000349 | OSC1                     | OSCILLATOR-CLOCK      | 66MHz, 100ppm, 10 TTL, BK, 5V, 45mA |
| 2804-001230 | OSC2                     | OSCILLATOR-CLOCK      | 47.7789MHz, 50ppm, 10TTL & CMOS,    |
| 2901-000229 | LF1, LF2, LF3, LF4, LF5  | FILTER-EMI SMD        | 50V, 300mA, -, 22nF, 4.5x1.8x3.2mm  |
| 2901-000235 | LF6, LF10                | FILTER-EMI SMD        | 50V, 300mA, -, 150pF, 4.5x1.8x3.2,  |
| 3301-001074 | B7, B113, B114, BD1, R96 | CORE-FERRITE BEAD     | AB, 2.0x1.25x0.9mm, -, -            |
| 3702-000118 | J1                       | CONNECTOR-RIBBON      | 36P, FEMALE, ANGLE, AU              |
| 3709-000177 | J7                       | CONNECTOR-CARD EDGE   | 72P, 1.27mm, ANGLE, SN              |
| 3711-001091 | J2                       | CONNECTOR-HEADER      | BOX, 7P, 1R, 2.5mm, STRAIGHT, SN    |
| 3711-003204 | J5                       | CONNECTOR-HEADER      | BOX, 24P, 2R, 2mm, STRAIGHT, SN     |
| 3711-003205 | J11                      | CONNECTOR-HEADER      | BOX, 4P, 1R, 2.0mm, STRAIGHT, SN    |
| 4701-001020 | U29                      | FREQ-ATTENUATOR       | 5-80MHz, 15dB, -, 0.03W             |
| JC11-10507A | U28                      | IC MASK ROM-HIGH      | ML-165, KM23C8105DG, SOP, 44P, 600  |
| JC11-10510A | U27                      | IC MASK ROM-PCL6, LOW | ml-165, KM23C8105DG, SOP, 44P, 600  |
| JC41-00003A | PCB-6050                 | PCB—CONTROLLER        | ML-6050, FR-4, 4, 1.6, 192.5*145    |

**7-2-2. Controller Board (Only XEU)**

| SEC. Code          | Location No.               | Description         | Spec                                  |
|--------------------|----------------------------|---------------------|---------------------------------------|
| <b>JC92-01089B</b> |                            | <b>Controller</b>   |                                       |
| 0803-000117        | U35                        | IC-TTL              | 74F14, INVERTER, SOP, 14P, 150MIL,    |
| 0803-000117        | U39                        | IC-TTL              | 74F14, INVERTER, SOP, 14P, 150MIL,    |
| 0803-000207        | U36                        | IC-TTL              | 74F08, AND GATE, SOP, 14P, 150MIL,    |
| 0803-000274        | U34                        | IC-TTL              | 74F32, OR GATE, SOP, 14P, 150MIL, Q   |
| 0803-000303        | U41                        | IC-TTL              | 74F74, D FLIP-FLOP, SOP, 14P, 150M    |
| 0803-003058        | U33                        | IC-TTL              | 74F1071, ESD, SOP, 20P, -, -, TP, PLA |
| 0903-001126        | U1                         | IC-MICROCONTROLLER  | 32C6100, 32BIT, QFP, 208P, -, 33MHz   |
| 1103-000133        | U12                        | IC-EEPROM           | 93C66, 256x16BIT, SOP, 8P, 150MIL,    |
| 1105-000191        | U3, U4                     | IC-DRAM             | 416C120, -, -, -, 70nS, 5V, -, -, 0t  |
| 1107-001077        | U31, U32                   | IC-FLASH MEMORY     | 29F800, 512Kx16BIT, SOP, 44P, 512M    |
| 1203-000346        | U30                        | IC-VOL. SUPERVISORY | 7705, SOP, 8P, 150MIL, PLASTIC, 20V   |
| 2007-000029        | R290, R291, R99            | R-CHIP              | 00OHM, 5%, 1/10W, DA, TP, 2012        |
| 2007-000029        | R122, R123, R124, R159     | R-CHIP              | 00OHM, 5%, 1/10W, DA, TP, 2012        |
| 2007-000290        | R125, R273, R274, R275,    | R-CHIP              | 100OHM, 5%, 1/10W, DA, TP, 2012       |
| 2007-000290        | R276, R277, R278           | R-CHIP              | 100OHM, 5%, 1/10W, DA, TP, 2012       |
| 2007-000300        | R139, R174, R267, R268     | R-CHIP              | 10KOHM, 5%, 1/10W, DA, TP, 2012       |
|                    | R269, R270, R271, R272,    |                     |                                       |
|                    | R298, R43, R44, R45, R46,  |                     |                                       |
|                    | R133, R134                 |                     |                                       |
| 2007-000308        | R34, R35, R55, R56, R57,   | R-CHIP              | 100OHM, 5%, 1/10W, DA, TP, 2012       |
|                    | R58, R66, R67, R68, R69,   |                     |                                       |
|                    | R70, R71, R72, R73, R74,   |                     |                                       |
|                    | R75, R76, R77, R79, R80,   |                     |                                       |
|                    | R83, R131, R132, R143      |                     |                                       |
| 2007-000449        | R120                       | R-CHIP              | 180OHM, 5%, 1/10W, DA, TP, 2012       |
| 2007-000468        | R104, R105, R106, R107,    | R-CHIP              | 1KOHM, 5%, 1/10W, DA, TP, 2012        |
|                    | R108, R114, R115, R116,    |                     |                                       |
|                    | R130, R140, R149, R296,    |                     |                                       |
|                    | R53, R97, R98, R101, R102, |                     |                                       |
|                    | R103                       |                     |                                       |
| 2007-000493        | R129                       | R-CHIP              | 2.2KOHM, 5%, 1/10W, DA, TP, 2012      |
| 2007-000686        | R265, R266                 | R-CHIP              | 3.3KOHM, 5%, 1/10W, DA, TP, 2012      |
| 2007-000781        | R150, R153, R154, R168,    | R-CHIP              | 33OHM, 5%, 1/10W, DA, TP, 2012        |
|                    | R36, R37, R38, R39, R40,   |                     |                                       |
|                    | R59, R87, R88, R89, R90,   |                     |                                       |
|                    | R91, R92, R93, R94, R127,  |                     |                                       |



| SEC. Code   | Location No.                 | Description     | Spec                                |
|-------------|------------------------------|-----------------|-------------------------------------|
| 2007-000781 | R128, R142, R144             | R-CHIP          | 33OHM, 5%, 1/10W, DA, TP, 2012      |
| 2007-000931 | R42                          | R-CHIP          | 470OHM, 5%, 1/10W, DA, TP, 2012     |
| 2007-000964 | R109, R110, R111, R112,      | R-CHIP          | 5.1KOHM, 5%, 1/10W, DA, TP, 2012    |
|             | R113, R264                   |                 |                                     |
| 2007-001133 | R33, R84, R126               | R-CHIP          | 68OHM, 5%, 1/10W, DA, TP, 2012      |
| 2011-001094 | RA1, RA2, RA3, RA4, RA5,     | R-NETWORK       | 39ohm, 5%, 1/16W, L, CHIP, 8P, TP   |
|             | RA6, RA13, RA14, RA7, RA8,   |                 |                                     |
|             | RA9, RA10, RA11, RA12        |                 |                                     |
| 2203-000192 | C12, C13, C14, C15, C16      | C-CERAMIC, CHIP | 100nF, +80-20%, 50V, Y5V, TP, 2012, |
|             | C160, C177, C181, C182,      |                 |                                     |
|             | C183, C184, C17, C18, C19,   |                 |                                     |
|             | C20, C21, C22, C185, C186,   |                 |                                     |
|             | C187, C188, C189, C192, C23, |                 |                                     |
|             | C24, C25, C32, C33, C34,     |                 |                                     |
|             | C323, C324, C325, C326,      |                 |                                     |
|             | C327, C328, C329, C331,      |                 |                                     |
|             | C332, C333, C334, C335,      |                 |                                     |
|             | C337, C338, C339, C355,      |                 |                                     |
|             | C35, C36, C37, C42, C46,     |                 |                                     |
|             | C47, C358, C6, C7, C8, C9,   |                 |                                     |
|             | C10, C11                     |                 |                                     |
| 2203-000239 | C128, C129, C130, C163,      | C-CERAMIC, CHIP | 100pF, 5%, 50V, NPO, TP, 2012, -    |
|             | C164, C168, C169, C170,      |                 |                                     |
|             | C171, C172, C173, C174,      |                 |                                     |
|             | C175, C176, C178, C179,      |                 |                                     |
|             | C180, C320                   |                 |                                     |
| 2203-000260 | C161                         | C-CERAMIC, CHIP | 10nF, 10%, 50V, X7R, TP, 2012, -    |
| 2203-000429 | C363, C51, C52, C53, C54,    | C-CERAMIC, CHIP | 18pF, 5%, 50V, NPO, TP, 2012, -     |
|             | C55, C56, C57, C58, C59,     |                 |                                     |
|             | C60, C61, C62, C63, C64,     |                 |                                     |
|             | C65, C66, C67, C68, C69,     |                 |                                     |
|             | C70, C71, C72, C73, C74,     |                 |                                     |
|             | C75, C76, C77, C78, C79,     |                 |                                     |
|             | C80, C81, C82, C83, C84,     |                 |                                     |
|             | C85, C167                    |                 |                                     |
| 2203-000444 | C139, C144, C145, C146,      | C-CERAMIC, CHIP | 1nF, 10%, 50V, X7R, TP, 2012, -     |
|             | C147, C359                   |                 |                                     |
| 2203-000455 | C348, C349, C350, C351,      | C-CERAMIC, CHIP | 1nF, 5%, 50V, NPO, TP, 2012, -      |
|             | C352, C366, C367, C368       |                 |                                     |

|  | SEC. Code   | Location No.            | Description           | Spec                                |
|--|-------------|-------------------------|-----------------------|-------------------------------------|
|  | 2203-000595 | C301                    | C-CERAMIC, CHIP       | 220pF, 5%, 50V, NPO, TP, 2012, -    |
|  | 2203-000634 | C108, C109, C110, C111, | C-CERAMIC, CHIP       | 22pF, 5%, 50V, NPO, TP, 2012, -     |
|  | 2203-000634 | C112, C120, C157, C158, | C-CERAMIC, CHIP       | 22pF, 5%, 50V, NPO, TP, 2012, -     |
|  |             | C165, C166, C190, C314  |                       |                                     |
|  | 2203-000938 | C341, C342, C343, C344, | C-CERAMIC, CHIP       | 470pF, 5%, 50V, NPO, TP, 2012, -    |
|  |             | C345, C346, C347        |                       |                                     |
|  | 2203-001002 | C104, C105, C107, C113  | C-CERAMIC, CHIP       | 47pF, 5%, 50V, NPO, TP, 2012, -     |
|  | 2203-001158 | C48, C50, C306          | C-CERAMIC, CHIP       | 68pF, 5%, 50V, NPO, TP, 2012, -     |
|  | 2404-000128 | C162                    | C-TA, CHIP            | 10uF, 20%, 16V, -, TP, 6032, -      |
|  | 2404-000308 | C1, C2, C3, C191        | C-TA, CHIP            | 33uF, 20%, 10V, -, TP, 7342, 4.4mm  |
|  | 2404-000308 | C304, C340              | C-TA, CHIP            | 33uF, 20%, 10V, -, TP, 7342, 4.4mm  |
|  | 2804-000349 | OSC1                    | OSCILLATOR-CLOCK      | 66MHz, 100ppm, 10 TTL, BK, 5V, 45mA |
|  | 2804-001230 | OSC2                    | OSCILLATOR-CLOCK      | 47.7789MHz, 50ppm, 10TTL & CMOS,    |
|  | 2901-000229 | LF1, LF2, LF3, LF4, LF5 | FILTER-EMI SMD        | 50V, 300mA, -, 22nF, 4.5x1.8x3.2mm  |
|  | 2901-000229 | LF9                     | FILTER-EMI SMD        | 50V, 300mA, -, 22nF, 4.5x1.8x3.2mm  |
|  | 2901-000235 | LF6, LF10               | FILTER-EMI SMD        | 50V, 300mA, -, 150pF, 4.5x1.8x3.2,  |
|  | 3301-001074 | B5, B6, R96             | CORE-FERRITE BEAD     | AB, 2.0x1.25x0.9mm, -, -            |
|  | 3301-001074 | B7, B8, B113, B114, BD1 | CORE-FERRITE BEAD     | AB, 2.0x1.25x0.9mm, -, -            |
|  | 3702-000118 | J1                      | CONNECTOR-RIBBON      | 36P, FEMALE, ANGLE, AU              |
|  | 3709-000177 | J7                      | CONNECTOR-CARD EDGE   | 72P, 1.27mm, ANGLE, SN              |
|  | 3711-001091 | J2                      | CONNECTOR-HEADER      | BOX, 7P, 1R, 2.5mm, STRAIGHT, SN    |
|  | 3711-003204 | J5                      | CONNECTOR-HEADER      | BOX, 24P, 2R, 2mm, STRAIGHT, SN     |
|  | 3711-003205 | J11                     | CONNECTOR-HEADER      | BOX, 4P, 1R, 2.0mm, STRAIGHT, SN    |
|  | 4701-001020 | U29                     | FREQ-ATTENUATOR       | 5-80MHz, 15dB, -, 0.03W             |
|  | JC11-10507A | U28                     | IC MASK ROM-HIGH      | ML-165, KM23C8105DG, SOP, 44P, 600  |
|  | JC11-10510A | U27                     | IC MASK ROM-PCL6, LOW | ml-165, KM23C8105DG, SOP, 44P, 600  |
|  | JC13-10506A | U40                     | IC ASIC-RET, GRAY     | ML-165, HYPER CHIP, PQFP, 100P, 14  |
|  | JC41-00003A | PCB-6050                | PCB—CONTROLLER        | ML-6050, FR-4, 4, 1.6, 192.5*145    |

### 7-3. LED PANNEL Parts Lists

| SEC. Code          | Location No.   | Description         | Spec                           |
|--------------------|----------------|---------------------|--------------------------------|
| <b>JC92-00346A</b> |                | <b>BPA-PANEL</b>    |                                |
| 0601-000161        | LED1           | LED                 | ROUND,GRN,5mm,563nm            |
| 0601-000255        | LED4           | LED                 | ROUND,RED,5mm,700nm            |
| 0601-000304        | LED2, LED3     | LED                 | ROUND,YEL,5mm,585nm            |
| 2001-000032        | R1, R2, R3, R4 | R-CARBON            | 180OHM,5%,1/4W,AA,TP,-         |
| 2202-000579        | C1             | C-CERAMIC,MLC-AXIAL | 100nF,+80-20%,50V,Z5U,TP,2.5x4 |
| 3404-000116        | SW1            | SWITCH-TACT         | 12V,50mA,160gf,6X6X3.6mm,SPST  |
| 3711-001096        | J1             | CONNECTOR-HEADER    | BOX,7P,1R,2.5mm,ANGLE,SN       |
| JC41-10003A        | -              | PCB-PANEL LED       | ML-85/84,FR-4,2L,1.6T,47X71    |

### 7-4. PTL Board Parts Lists

| SEC. Code          | Location No.   | Description | Spec                            |
|--------------------|--|-------------|---------------------------------|
| <b>JC92-01050A</b> |  | <b>PTL</b>  |                                 |
| 0601-001244        | LD1, LD2, LD3, LD4, LD5,<br>LD6, LD7, LD8, LD9, LD10 | LED         | ROUND, RED, 3mm, 690nm          |
| 0601-001244        | LD11, LD12, LD13, LD14,<br>LD15, LD16, LD17, LD18    | LED         | ROUND, RED, 3mm, 690nm          |
| JC41-10530A        | -  | PCB-PTL     | ML-5500, FRI, 1L, T1.6, 218X8.5 |

## 6. Exploded Views and Parts Lists

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6-1. Main Exploded View

6-2. Cover Exploded View

6-3. Frame Exploded View

6-4. Fuser Exploded View

6-5. Drive Assembly Exploded View

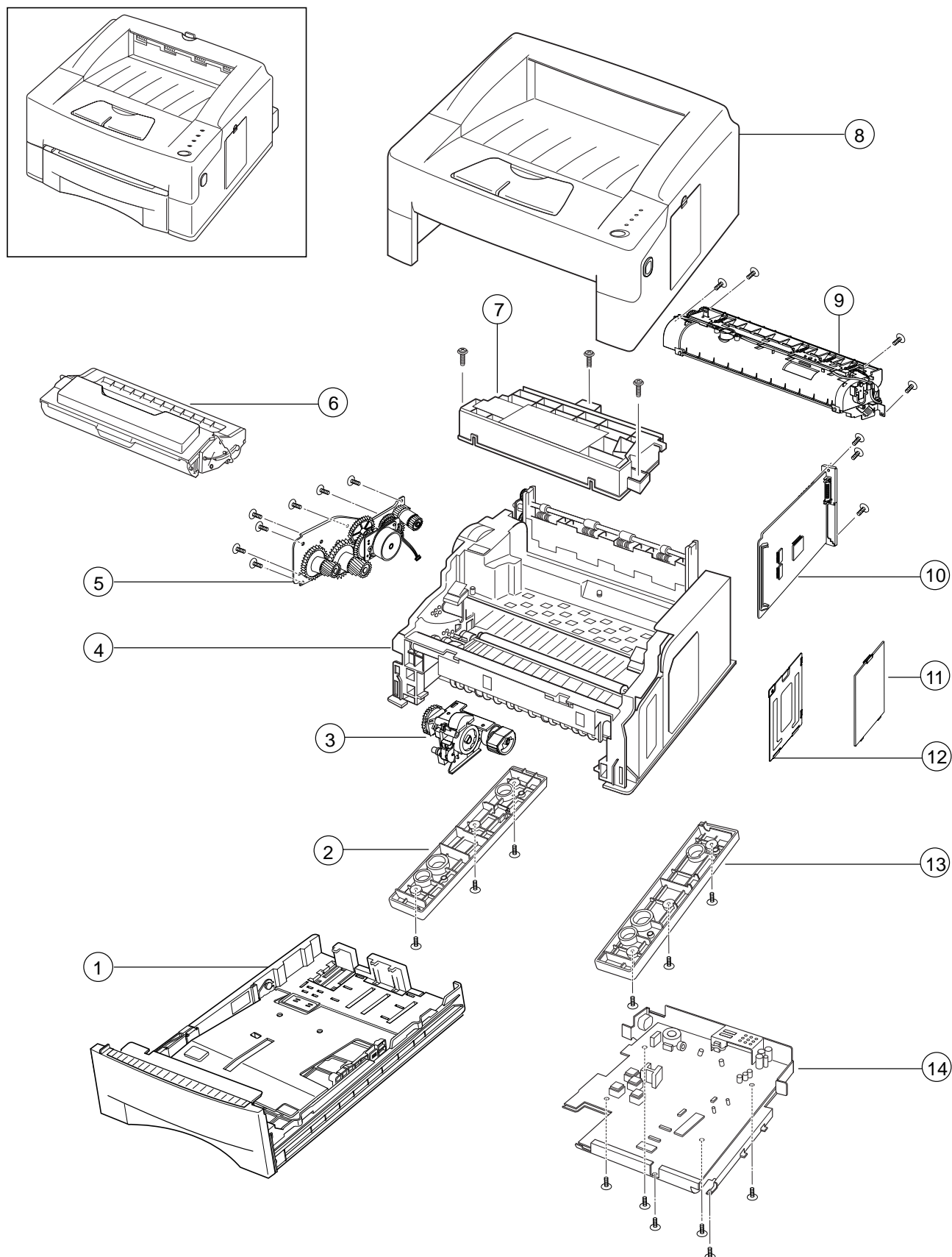
6-6. Pick-Up Exploded View

6-7. Cassette Exploded View

6-8. Second Cassette Exploded View (Option)

6-9. Second Cassette Frame Exploded View (Option)

## 6-1. Main Exploded View



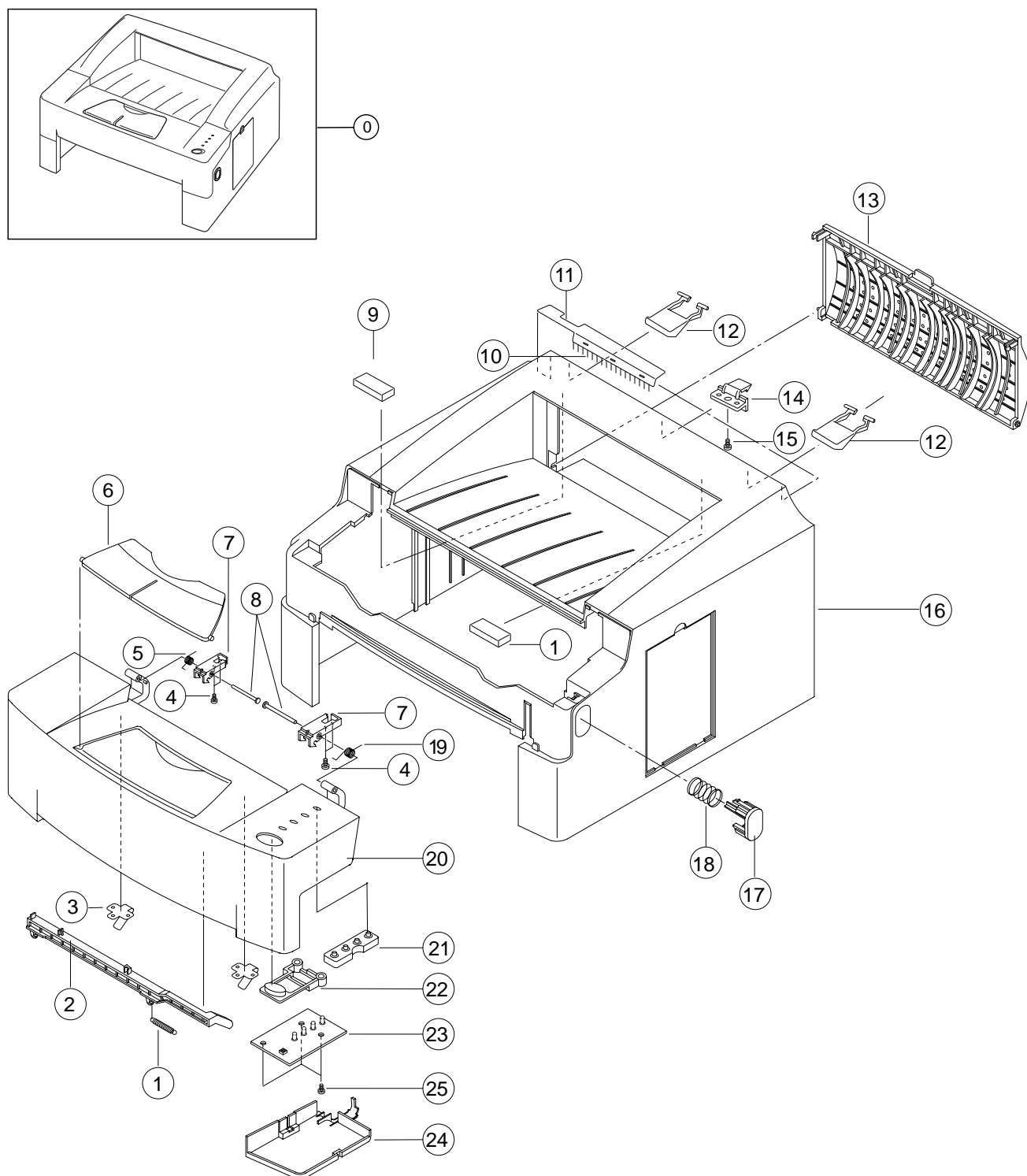
**Main Parts Lists**

| Location No. | Description          | SEC. Code   | Q'ty | Remark   |
|--------------|----------------------|-------------|------|----------|
| 1            | MEA RACK-FEEDER CAS  | JC97-01077A | 1    | O        |
| 2            | MEC-BRKT, BASE R     | JC75-10922A | 1    | O        |
| 3            | MEA RACK-FEEDER.     | JC97-01078A | 1    | O        |
| 4            | ELA HOU-FRAME(12)    | JC96-01092A | 1    | X        |
| 5            | ELA HOU-MOTOR MAIN   | JC96-01099A | 1    | O        |
| 6            | ELA-DEVE UNIT        | ML+6000D5   | 1    | X        |
| 7            | UNIT-LSU             | JC59-10507A | 1    | O        |
| 8            | ELA HOU-CVR_MAIN     | JC96-01365A | 1    | O (220V) |
|              |                      | JC96-01364A | 1    | O (110V) |
| 9            | ELA HOU-FUSER_220,KR | JC96-01280A | 1    | O        |
| 10           | ELA HOU-CONTROLLER_K | JC96-00982A | 1    | O (220V) |
|              |                      | JC96-00982B | 1    | O (110V) |
| 11           | PRO-COVER_SIMM       | JC72-41224A | 1    | O        |
| 12           | IPR-SHIELD SIMM      | JC70-10234A | 1    | O        |
| 13           | MEC-BRKT, BASE       | JC75-10920B | 1    | O        |
| 14           | ELA HOU-ENG B'D(220) | JC96-01228A | 1    | O (220V) |
|              | ELA HOU-ENG B'D(110) | JC96-01236A | 1    | O (110V) |

**Note**

- 110V : for QwikLaser 6050
- 220V : for ML-6050

## 6-2. Cover Exploded View



**Cover Parts Lists**

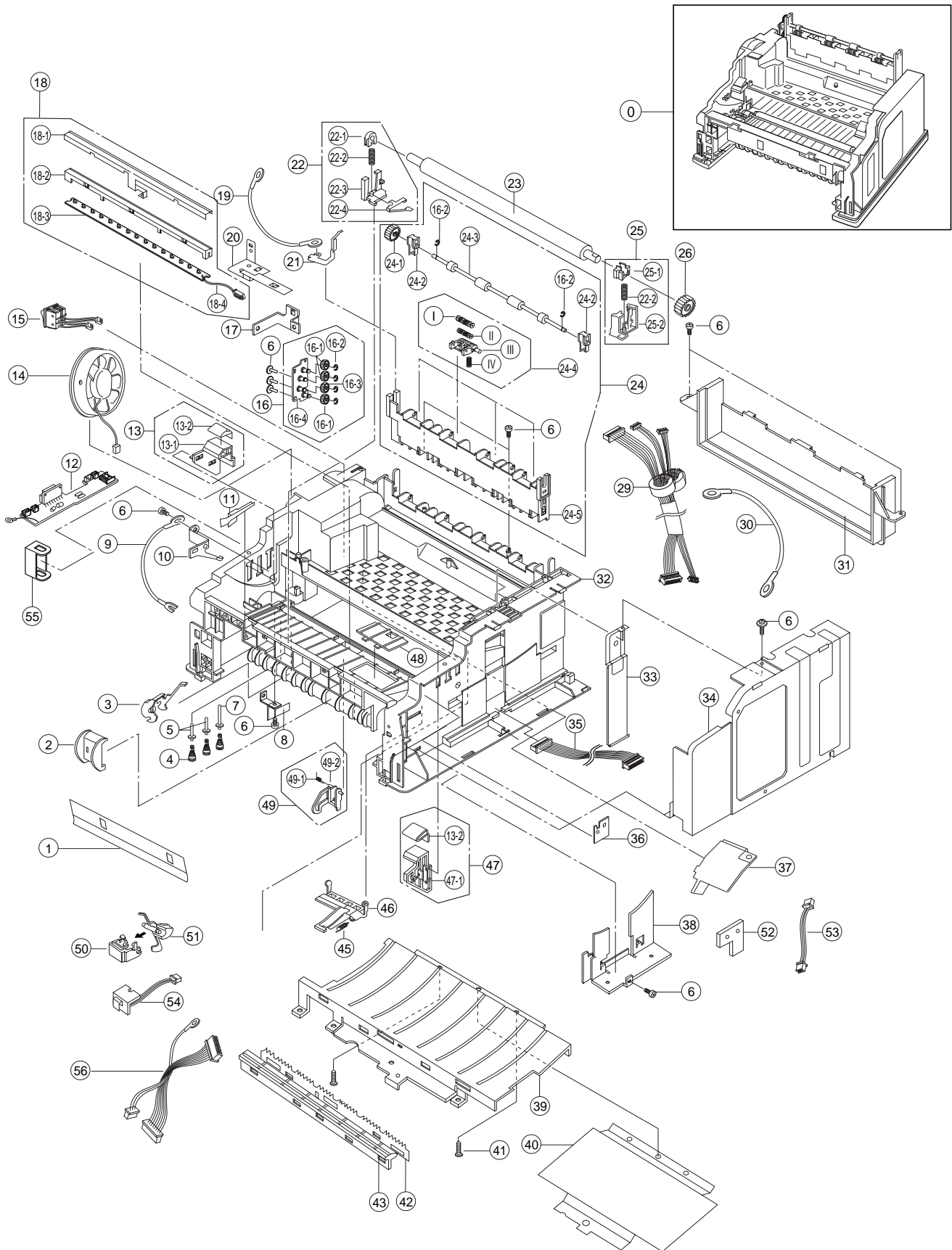
| Location No. | Description          | SEC. Code    | Q'ty | Remark   |
|--------------|----------------------|--------------|------|----------|
| 0            | ELA HOU-CVR_MAIN     | JC96-01365A  | 1    | O (220V) |
|              |                      | JC96-01364A  | 1    | O (110V) |
| 1            | SPRING-HOOK LEVER    | 6107-000133  | 1    | X        |
| 2            | LEVER-HOOK           | JC72-40325A  | 1    | X        |
| 3            | PLATE-SPRING, DEV    | JC70-10223A  | 2    | X        |
| 4            | SCREW-TAPTITE        | 6003-000002  | 4    | X        |
| 5            | SPRING-COVER OPEN, L | JC61-70944A  | 1    | X        |
| 6            | STACKER-SUB          | JC72-41220A  | 1    | X        |
| 7            | HINGE-HSG, R         | JC72-41216A  | 2    | X        |
| 8            | SHAFT-COVER OPEN     | JC70-10228A  | 2    | X        |
| 9            | PAD-DUMMY            | JC73-30912A  | 2    | X        |
| 10           | BRUSH-ANTI           | JC74-40902A  | 1    | X        |
| 11           | GROUND-ANTI          | JC70-11057A  | 1    | X        |
| 12           | GUIDE-DUMMY          | JC72-41111A  | 2    | X        |
| 13           | COVER-EXIT           | JC72-41221A  | 1    | X        |
| 14           | LOCKER-EXIT          | JC72-41286A  | 1    | X        |
| 15           | SCREW-TAPTITE        | 6003-000196A | 1    | X        |
| 16           | COVER-MAIN           | JC72-41214A  | 1    | X        |
| 17           | BUTTON-C/O           | JC72-40336D  | 1    | X        |
| 18           | SPRING-CS (BUTTON)   | 6107-000117  | 1    | X        |
| 19           | SPRING-COVER OPEN, R | JC61-70945A  | 1    | X        |
| 20           | COVER-FRONT, LED     | JC72-41215F  | 1    | X (220V) |
|              | COVER-FRONT, XAR     | JC72-41215E  | 1    | X (110V) |
| 21           | WINDOW-LED           | JC72-41397A  | 1    | X        |
| 22           | BUTTON-PANEL, LED    | JC72-41219A  | 1    | X        |
| 23           | PBA-PANEL, LED       | JC92-00346A  | 1    | O        |
| 24           | CAP-PANEL WIRE       | JC72-41222A  | 1    | X        |
| 25           | SCREW-TAPTITE        | 6003-000002  | 3    | X        |

**Note**

- 110V : for QwikLaser 6050
- 220V : for ML-6050



## 6-3. Frame Exploded View



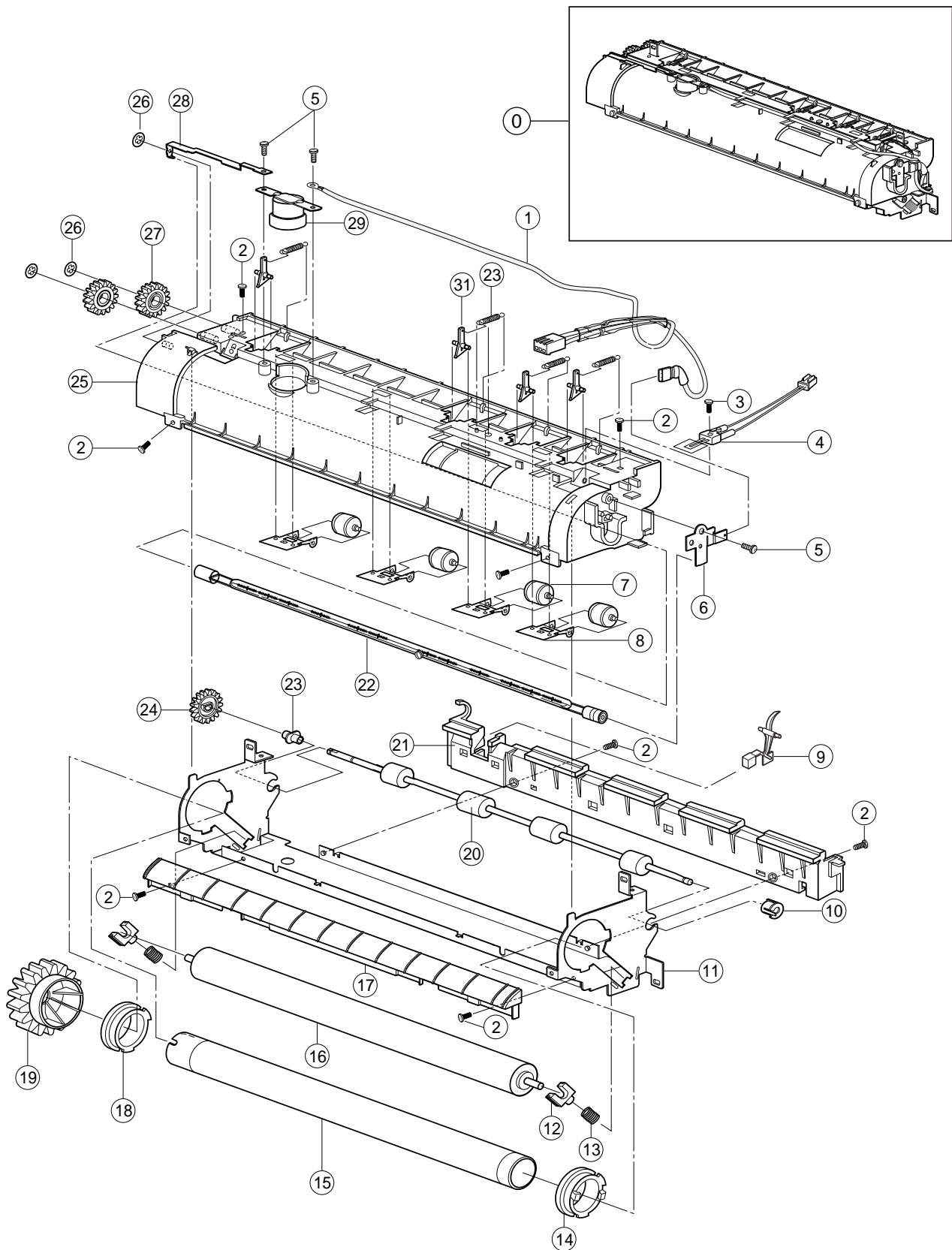
**Frame Parts Lists**

| Location No. | Description           | SEC. Code   | Q'ty | Remark |
|--------------|-----------------------|-------------|------|--------|
| 0            | ELA HOU-FRAME (12)    | JC96-01338B | 1    | X      |
| 1            | SHEET COVER OPC       | JC72-40909A | 1    | X      |
| 2            | GUIDE-SKEW(12)        | JC72-41350A | 1    | X      |
| 3            | ACTUATOR-FEED(12)     | JC72-00012A | 1    | X      |
| 4            | SPRING-CS             | 6107-000104 | 3    | X      |
| 5            | CONNECTOR TERMINAL2   | 3712-000165 | 2    | X      |
| 6            | SCREW-TAPTITE 3*10    | 6003-000002 | 6    | X      |
| 7            | CONNECTOR TERMINAL1   | 3712-000166 | 1    | X      |
| 8            | GROUND-PLT MOTOR      | JC70-10013A | 1    | X      |
| 9            | CBF HARNESS           | JC39-40576A | 1    | X      |
| 10           | GROUND-OPC(12)        | JC70-11070A | 1    | X      |
| 11           | GUIDE-DUST            | JC70-11068A | 1    | X      |
| 12           | MOTOR BOARD           | JC92-01045A | 1    | X      |
| 13           | ELA-DEVELOPER, GUID   | JC96-00290A | 1    | O      |
| 13-1         | GUIDE-DEV L           | JC72-40274A | 1    | X      |
| 13-2         | SPRING-PS G/DEV       | JC61-70001A | 2    | X      |
| 14           | FAN DC 24V            | 3103-001049 | 1    | X      |
| 15           | SWITCH                | JC39-00004A | 1    | X      |
| 16           | MEA RACK-BRKT_EXIT    | JC97-01198A | 1    | O      |
| 16-1         | GEAR-EXIT/U ID        | JC66-40006A | 4    | X      |
| 16-2         | RING-C ID3            | 6044-000159 | 2    | X      |
| 16-3         | GEAR-EXIT, IDLE(Z17)  | JC66-40964A | 1    | X      |
| 16-4         | BRACKET_EXIT          | JC70-11075A | 1    | X      |
| 17           | EARTH PLATE FUSER     | JC70-10911A | 1    | X      |
| 18           | ELA HOU-PTL           | JC96-01150A | 1    | O      |
| 18-1         | EARTH TRNAS (12)      | JC70-11023A | 1    | X      |
| 18-2         | HOLDER-PTL            | JC72-41187A | 1    | X      |
| 18-3         | PBA MAIN PTL          | JC92-01050A | 1    | X      |
| 18-4         | CBF HARNESS           | JC39-40543A | 1    | X      |
| 19           | CBF HARNESS           | JC39-40546A | 1    | X      |
| 20           | GND PLATE G/TR        | JC70-10980A | 1    | X      |
| 21           | GROUND-EXIT           | JC70-11058A | 1    | X      |
| 22           | MEA RACK-TR HOLDER, L | JC97-01079A | 1    | O      |
| 22-1         | BUSHING-TR12 (L)      | JC72-41283A | 1    | X      |
| 22-2         | SPRING-TR (12)        | JC61-70940A | 2    | X      |
| 22-3         | HOLDER-TR L (12)      | JC72-41285A | 1    | X      |
| 22-4         | SPRING-PLATE (12)     | JC70-11050A | 1    | X      |
| 23           | ROLLER-TRANSFER       | JC75-10962A | 1    | O      |

| Location No. | Description           | SEC. Code   | Q'ty | Remark |
|--------------|-----------------------|-------------|------|--------|
| 24           | HEA RACK-HOU EXIT     | JC97-01104A | 1    | O      |
| 24-1         | GEAR-EXIT             | JC66-40209A | 1    | X      |
| 24-2         | BEARING-EXIT          | JC75-10529A | 2    | X      |
| 24-3         | ROLL EXIT FR/UP       | JC75-10957A | 1    | X      |
| 24-4         | MEA RACK-EXIT ROLLER  | JC97-01098A | 1    | X      |
| I            | ROLLER EXIT MAIN      | JC72-41081A | 4    | X      |
| II           | ROLLER EXIT FR        | JC72-41082A | 4    | X      |
| III          | HOLDER-EXIT           | JC72-41080A | 4    | X      |
| IV           | SPRING-CS             | 6107-000106 | 4    | X      |
| 24-5         | HOUSING-EXIT (250)    | JC72-41114A | 1    | X      |
| 25           | MEA RACK-TR HOLDER, R | JC97-01071A | 1    | O      |
| 25-1         | BUSHING-TR12 (R)      | JC72-41060A | 1    | X      |
| 25-2         | HOLDER-TR R (12)      | JC72-41062A | 1    | X      |
| 26           | GEAR-TRANSFER (12)    | JC66-40949A | 1    | O      |
| 29           | LSU-HARNESS           | JC39-40540A | 1    | X      |
| 30           | CBF-HARNESS           | JG39-40179A | 1    | X      |
| 31           | GUIDE-FUSER           | JC72-41223A | 1    | X      |
| 32           | BASE FRAME            | JC72-41113A | 1    | O      |
| 33           | SHIELD CAP WIRE       | JC70-10003A | 1    | X      |
| 34           | SHIELD ICU            | JC70-10225A | 1    | X      |
| 35           | CBF HARNESS           | JC39-40009A | 1    | X      |
| 36           | FILM-EMI              | JC74-10908A | 1    | X      |
| 37           | DAMPER-PLATE          | JC72-41288A | 1    | X      |
| 38           | GROUND-ICU            | JC70-10006A | 1    | X      |
| 39           | GUIDE-TRANSFER        | JC70-10220A | 1    | X      |
| 40           | SHEET GUIDE-TR        | JC74-10907A | 1    | X      |
| 41           | SCREW-TAPTITE 3*8     | 6003-000119 | 2    | X      |
| 42           | PLATE-SAW             | JC70-10232A | 1    | X      |
| 43           | HOLDER-SAW PLATE      | JC72-40247A | 1    | X      |
| 44           | ELA HOU-THERMISTOR    | JC96-01148A | 1    | X      |
| 45           | SPRING-CVR OPEN (12)  | JC61-70964A | 1    | X      |
| 46           | ACTUATOR-C/O          | JC72-40269A | 1    | X      |
| 47           | ELA-DEVELOPER, GUID   | JC96-00291A | 1    | O      |
| 47-1         | GUIDE-DEV R           | JC72-40275A | 1    | X      |
| 48           | ROM COVER             | JC72-41186A | 1    | X      |
| 49           | MEA RACK-EMPTY_ACT    | JC97-01207A | 1    | O      |
| 49-1         | SPRING-EMPTY          | JC61-70965A | 1    | X      |
| 49-2         | ACTUATOR-EMPTY12      | JC72-41290A | 1    | X      |
| 50           | ACTUATOR-TR           | JC72-41287A | 1    | O      |

| Location No. | Description          | SEC. Code   | Q'ty | Remark |
|--------------|----------------------|-------------|------|--------|
| 51           | HOLDER-ACTUATOR      | JC72-41289A | 1    | O      |
| 52           | PBA MAIN-CLN         | JC92-01084A | 1    | O      |
| 53           | CBF-HARNESS          | JC39-40513A | 1    | X      |
| 54           | ELA-HOU CLEANING PLT | JC96-01229A | 1    | X      |
| 55           | CAP-GND WIRE         | JC72-00011A | 1    | X      |
| 56           | CBF-HARNESS MOTOR    | JC39-40575A | 1    | X      |

6-4. Fuser Exploded View



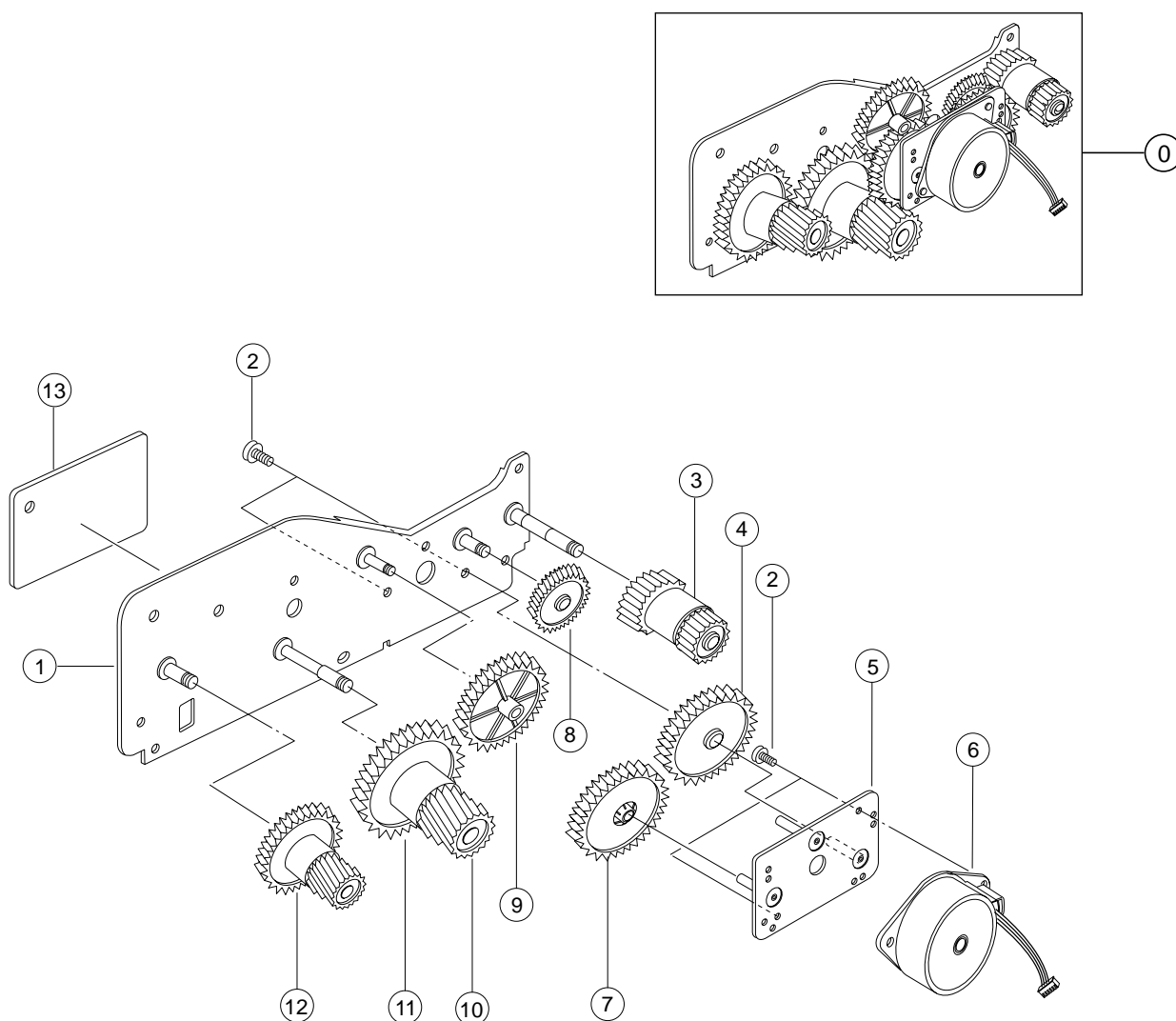
**Fuser Parts Lists**

| Location No. | Description              | SEC. Code   | Q'ty | Remark   |
|--------------|--------------------------|-------------|------|----------|
| 0            | ELA HOU-FUSER(110V)      | JC96-01093A | 1    | O (110V) |
|              | ELA HOU-FUSER(220V)      | JC96-01094A | 1    | O (220V) |
| 1            | CBF-HARNESS-FU(110)      | JC39-40609A | 1    | X        |
|              | CBF-HARNESS-FU(220)      | JC39-40610A | 1    | X        |
| 2            | SCREW-MACHINE M3x6, BH+  | 6001-000131 | 8    | X        |
| 3            | SCREW-TAPTITE M3x12, FH+ | 6003-000198 | 1    | X        |
| 4            | THERMISTOR-NTC           | 1404-001117 | 1    | O        |
| 5            | SCREW-TAPTITE M3x8, BH+  | 6003-000119 | 3    | X        |
| 6            | NPR-ELECTRODE FU R       | JC71-10201A | 1    | X        |
| 7            | PMO-ROLLER EXIT F/UP     | JC72-40342A | 4    | X        |
| 8            | SPRING-PS, EXIT F/UP     | JC70-11067A | 4    | X        |
| 9            | PMO-ACTUATOR EXIT        | JC72-41079A | 1    | O        |
| 10           | BEARING-EXIT FU          | JC66-10201A | 1    | X        |
| 11           | IPR-FUSER LOWER          | JC70-10983A | 1    | X        |
| 12           | PMO-BUSHING PR           | JC72-41078A | 2    | X        |
| 13           | SPRING-PR                | JC61-70923A | 2    | X        |
| 14           | PMO-BUSHING HR, R        | JC72-41077A | 1    | X        |
| 15           | NEX-ROLLER HEAT          | JC71-20901A | 1    | O        |
| 16           | MEC-ROLLER PRESSURE      | JC75-10956A | 1    | O        |
| 17           | PMO-GUIDE PATH           | JC72-41074A | 1    | X        |
| 18           | PMO-BUSHING HR, L        | JC72-41076A | 1    | X        |
| 19           | GEAR-FUSER               | JC66-40926A | 1    | O        |
| 20           | MEC-ROLLER EXIT, FU/LR   | JC75-10955A | 1    | X        |
| 21           | PMO-FUSER REAR           | JC72-41075A | 1    | X        |
| 22           | LAMP-HALOGEN             | 4713-001075 | 1    | O (220V) |
|              |                          | 4713-001076 | 1    | O (110V) |
| 23           | BEARING-EXIT FU L        | JC66-10200A | 1    | X        |
| 24           | GEAR-EXIT                | JC66-40209A | 1    | X        |
| 25           | PMO-FUSER UPPER          | JC72-41073A | 1    | X        |
| 26           | RING-CS                  | 6044-000001 | 3    | X        |
| 27           | GEAR-EXIT, L/ID          | JC66-40964A | 2    | X        |
| 28           | NPR-ELECTRODE FUSER      | JC71-10902A | 1    | X        |
| 29           | THERMOSTAT               | 4712-000001 | 1    | O        |
| 30           | PMO-CLAW SEPARATOR       | JC72-41064A | 4    | X        |
| 31           | SPRING-CLAW              | JC61-70922A | 4    | X        |

**Note**

- 110V : for QwikLaser 6050
- 220V : for ML-6050

## 6-5. Motor Exploded View

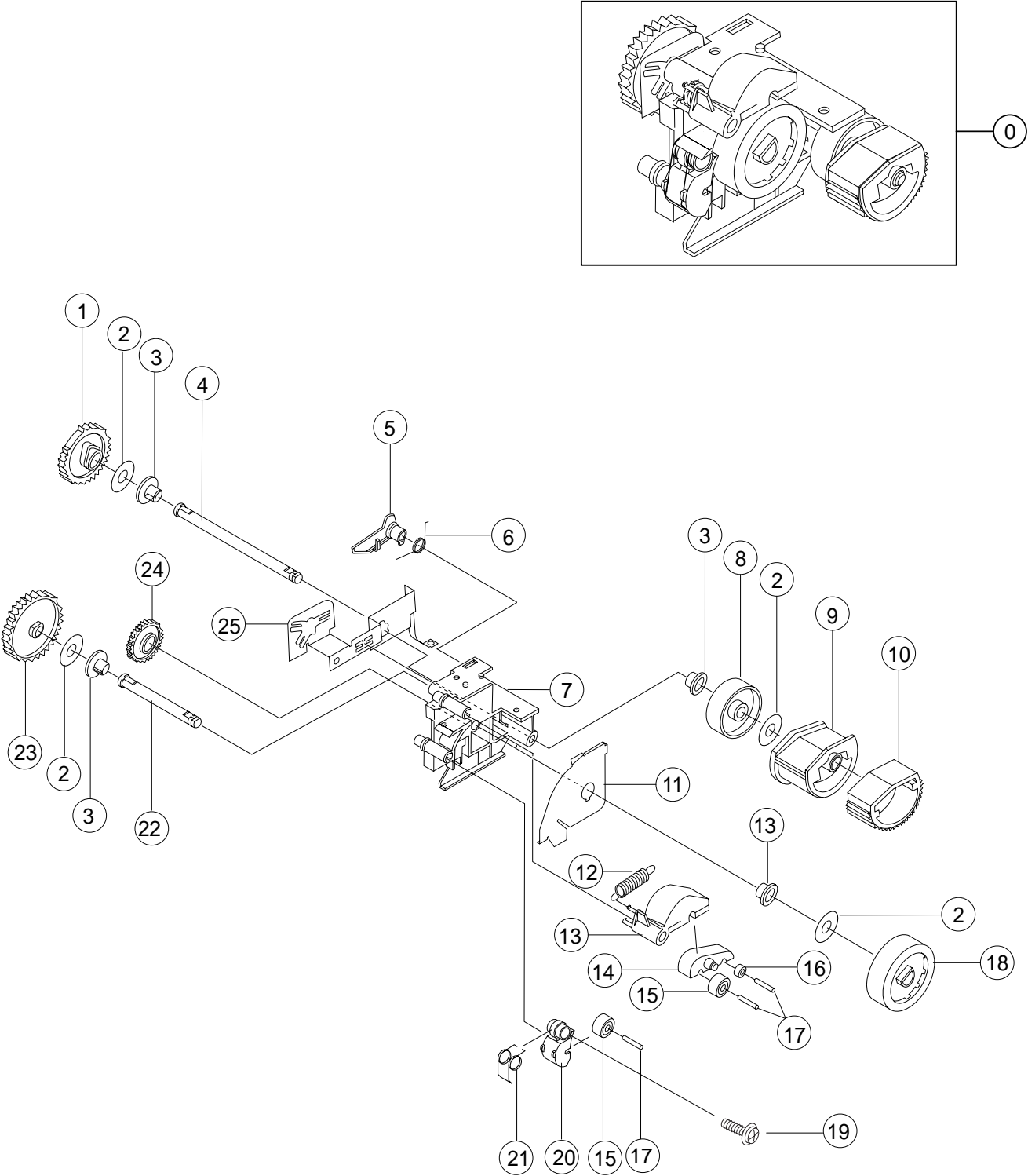


**Motor Parts Lists**

| Location No. | Description         | SEC. Code   | Q'ty | Remark |
|--------------|---------------------|-------------|------|--------|
| 0            | ELA HOU-MOTOR MAIN  | JC96-01099A | 1    | O      |
| 1            | IPR-BRKT_GEAR       | JC70-10984A | 1    | X      |
| 2            | SCREW-MACHINE M3x6  | 6001-000131 | 5    | X      |
| 3            | GEAR-FUSER DRIVE    | JC66-40378A | 1    | X      |
| 4            | GEAR-125/18         | JC66-40376A | 1    | X      |
| 5            | IPR-BRKT, MOTOR     | JC70-10985A | 1    | X      |
| 6            | MOTOR-STEP          | 3101-001144 | 1    | O      |
| 7            | GEAR-132/50 (12)    | JC66-40959A | 1    | X      |
| 8            | GEAR-IDLE, FU       | JC66-40377A | 1    | X      |
| 9            | GEAR-IDLE OPC (12)  | JC66-40960A | 1    | X      |
| 10           | GEAR-OPC DRV2       | JC66-40001A | 1    | X      |
| 11           | GEAR-OPC DRIVE (12) | JC66-40961A | 1    | X      |
| 12           | GEAR-FEED DRV (12)  | JC66-40962A | 1    | X      |
| 13           | FILM-BRACKET        | JC73-00002A | 1    | X      |



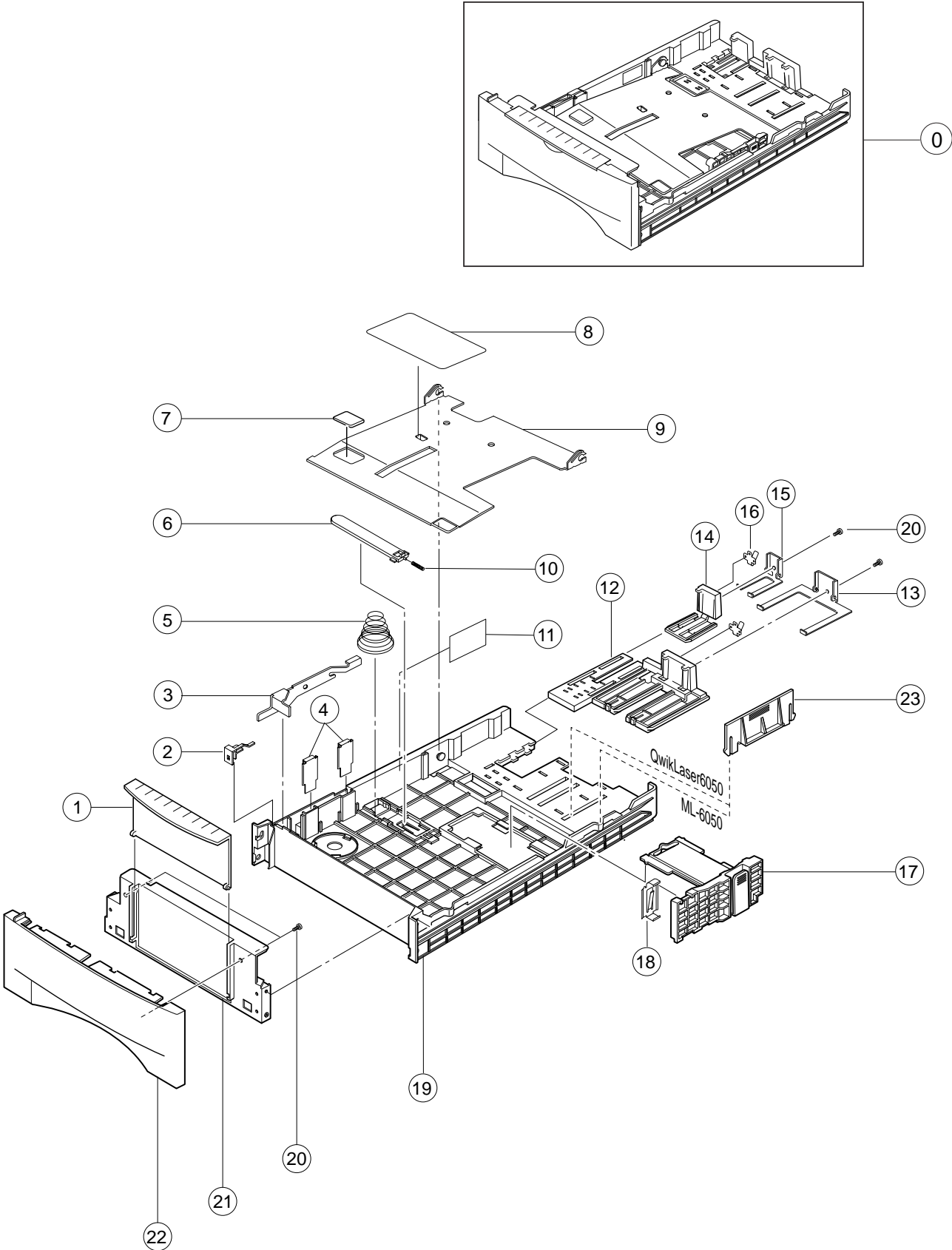
6-6. Pick-Up Exploded View



**Pick-Up Parts Lists**

| Location No. | Description                | SEC. Code   | Q'ty | Remark |
|--------------|----------------------------|-------------|------|--------|
| 0            | MEA RACK-FEEDER            | JC97-01078A | 1    | O      |
| 1            | PLT, GEAR-PICK UP          | JC66-40219A | 1    | X      |
| 2            | WASHER-PLAIN               | 6031-000021 | 4    | X      |
| 3            | PLT, BEARING-PICK UP       | JC66-10202A | 4    | X      |
| 4            | IMP, SHAFT-PICK UP         | JC70-10231A | 1    | X      |
| 5            | PLT, LEVER-PICK UP         | JC72-40254A | 1    | X      |
| 6            | SPRING PICK-UP             | JC61-70966A | 1    | X      |
| 7            | PLT, FRAME-FEED            | JC72-41115A | 1    | X      |
| 8            | PMP, IDLE-PICKUP           | JC72-41234A | 1    | X      |
| 9            | PLT, HOUSING-PICK UP       | JC72-40252A | 1    | X      |
| 10           | PLT, RUBBER-PICKUP         | JC73-40907A | 1    | X      |
| 11           | IMP, GUIDE-FEED            | JC70-10992A | 1    | X      |
| 12           | SPRING-FEED (2)            | JC61-70942A | 1    | X      |
| 13           | PLT, HOLDER-FEED2          | JC72-41185A | 1    | X      |
| 14           | PLT, SUB HOLER-FEED, SMALL | JC72-40266A | 1    | X      |
| 15           | PLT, ROLLER-FEED, LARGE    | JC72-40261A | 2    | X      |
| 16           | PLT, ROLLER-FEED, SMALL    | JC72-40262A | 1    | X      |
| 17           | IMP, SHAFT-FEED, IDLER     | JC70-10230A | 3    | X      |
| 18           | PLT, ROLLER-FEED, DRIVE    | JC72-41295A | 1    | X      |
| 19           | SCREW (M3X6 FH+, BLK)      | 6003-000002 | 1    | X      |
| 20           | PLT, HOLDER-FEED1          | JC72-41184A | 1    | X      |
| 21           | SPRING-FEED (1)            | JC61-70941A | 1    | X      |
| 22           | IMP, SHAFT-FEED            | JC70-10229A | 1    | X      |
| 23           | PLT, GEAR-FEED             | JC66-40375A | 1    | X      |
| 24           | PLT, GEAR-P/UP DRIVE       | JC66-40219A | 1    | X      |
| 25           | IMP, GND-FEED              | JC70-10991A | 1    | X      |

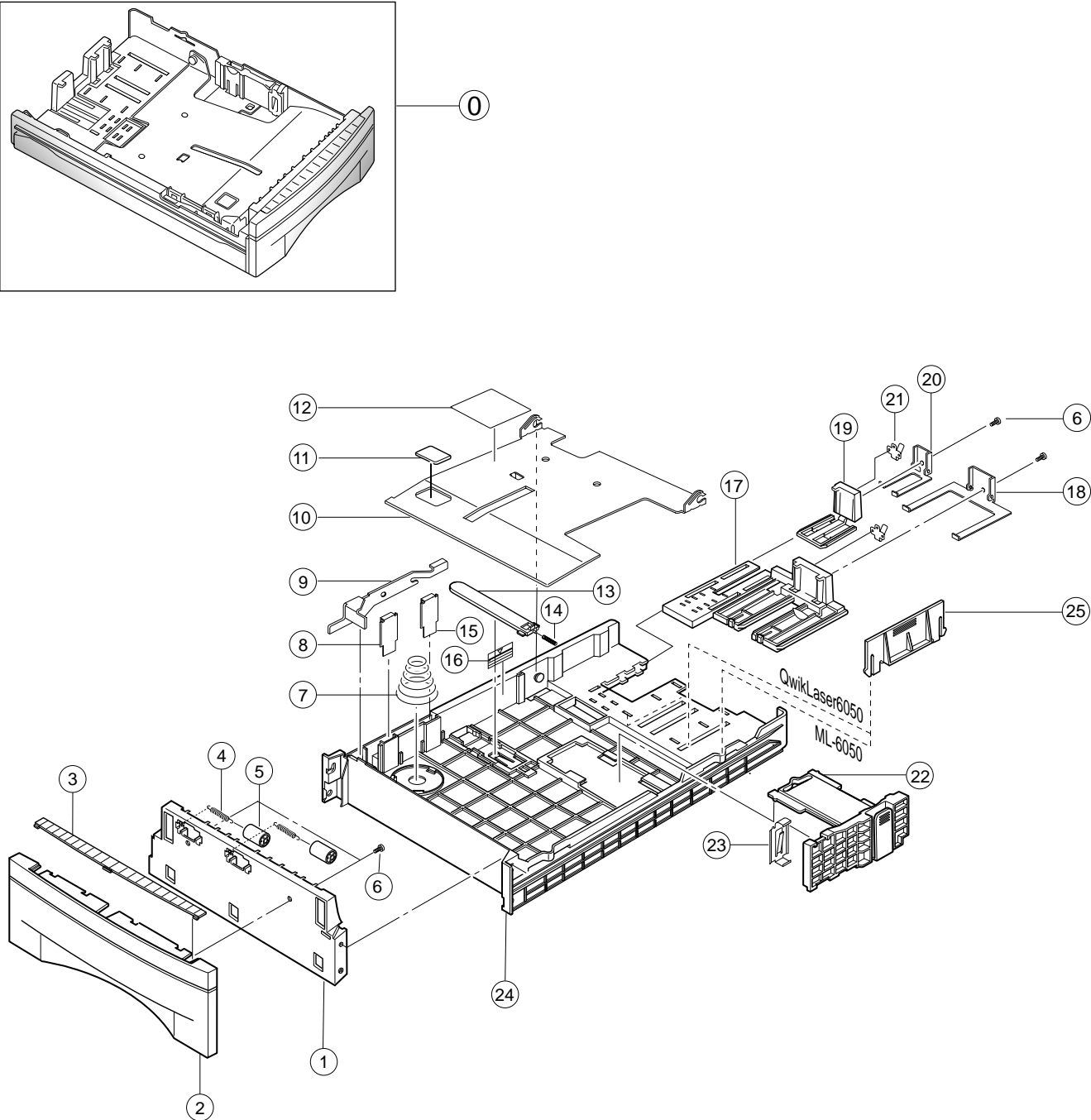
# 6-7. Cassette Exploded View



**Cassette Parts Lists**

| Location No. | Description                   | SEC. Code   | Q'ty | Remark |
|--------------|-------------------------------|-------------|------|--------|
| 0            | MEA RACK-FEEDER CAS           | JC97-01077A | 1    | O      |
| 1            | PMO-TRAY-MANUAL               | JC72-41387A | 1    | X      |
| 2            | PMO-HOLDER FINGER             | JC72-41182A | 1    | X      |
| 3            | IMP, FINGER                   | JC70-10213A | 1    | X      |
| 4            | IMP, GUIDE PLATE-PAPER        | JC70-10219A | 2    | X      |
| 5            | SPRING-KNOCK UP               | JC61-70951A | 1    | X      |
| 6            | LOCKER-PLATE                  | JC72-41210A | 1    | X      |
| 7            | MMP, PAD                      | JC73-10911A | 1    | X      |
| 8            | LABEL-PLATE                   | JC68-30929A | 1    | X      |
| 9            | IPR-PLT KNOCK UP(12)          | JC70-11022A | 1    | X      |
| 10           | SPRING-LOCKERPLATE            | JG61-70531A | 1    | X      |
| 11           | LABEL-HEIGHT                  | JG68-30572A | 1    | X      |
| 12           | PMO-GUIDE LEGAL               | JC72-41393A | 1    | X      |
| 13           | IPR-BRACKET_LEGAL             | JC70-11086A | 1    | X      |
| 14           | PMO-GUIAE_LETTER              | JC72-41392A | 1    | X      |
| 15           | IPR-BRACKET_LETTER            | JC70-11087A | 1    | X      |
| 16           | IPR-TENSION_LETTER            | JC70-11085A | 2    | X      |
| 17           | PMO-ADJUSTER_S CAST           | JC72-41394A | 1    | X      |
| 18           | IPR-GUIDE-PLATE               | JC70-10993A | 1    | X      |
| 19           | PMO-FRAME_CASSETTE, P         | JC72-41382A | 1    | X      |
| 20           | SCREW-TAPTITE M3x10 FH, WHITE | 6003-000002 | 4    | X      |
| 21           | GUIDE-CASSETTE, M             | JC72-00013A | 1    | X      |
| 22           | PMO-GUIDE SUB CAST.           | JC72-41225A | 1    | X      |
| 23           | PMO-GUIDE REAR                | JC72-41180A | 1    | X      |

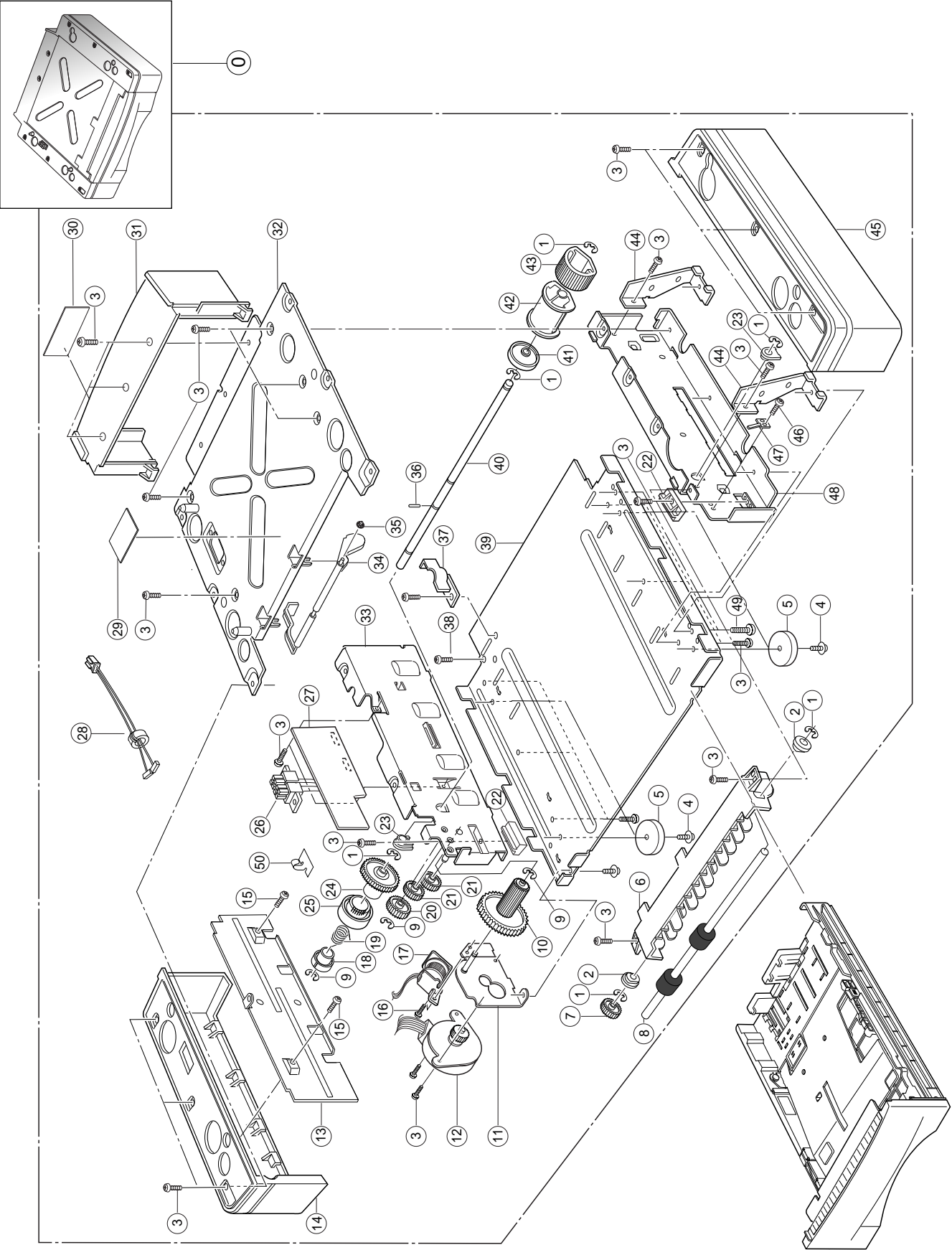
6-8. Second Cassette Exploded View



**Second Cassette Parts Lists**

| Location No. | Description          | SEC. Code    | Q'ty | Remark |
|--------------|----------------------|--------------|------|--------|
| 0            | MEA RACK-CAST.SCF    | JC97-01196A  | 1    | X      |
| 1            | GUIDE CST            | JC72-40306A  | 1    | X      |
| 2            | PMO-GUIDE-2'ND CAST. | JC72-41227A  | 1    | X      |
| 3            | PLATE-COLOR          | JC72-41226A  | 1    | X      |
| 4            | SPRING ES            | 6107-001047A | 2    | X      |
| 5            | ROLLER EXIT          | JC72-40361A  | 2    | X      |
| 6            | TAPTITE SCREW        | 6003-000196  | 2    | X      |
| 7            | SPRING KNOCKUP       | JC61-70951A  | 1    | X      |
| 8            | GUIDE SCF            | JC70-11076A  | 1    | X      |
| 9            | FINGER               | JC70-10213A  | 1    | X      |
| 10           | PLT KNOCK-UP (12)    | JC70-11022A  | 1    | X      |
| 11           | MMP, PAD             | JC73-10911A  | 1    | X      |
| 12           | LABEL(R) PLATE       | JC68-30929A  | 1    | X      |
| 13           | LOCKER-PLATE         | JC72-41210A  | 1    | X      |
| 14           | SPRING-LOCKER PLATE  | JG61-70531A  | 1    | X      |
| 15           | GUIDE PAPER          | JC70-10219A  | 1    | X      |
| 16           | LABEL(R) HEIGHT      | JG68-30572A  | 1    | X      |
| 17           | GUIDE-LEGAL          | JC72-41180A  | 1    | X      |
| 18           | IPR-BRACKET_LEGAL    | JC70-11086A  | 1    | X      |
| 19           | PMO-GUIDE_LETTER     | JC72-41392A  | 1    | X      |
| 20           | IPR-BRACKET_LETTER   | JC70-11087A  | 1    | X      |
| 21           | IPR-TENSION_LETTER   | JC70-11085A  | 2    | X      |
| 22           | GUIDE-SIDE CASSETTE  | JC72-41116A  | 1    | X      |
| 23           | GUIDE PLATE          | JC70-10993A  | 1    | X      |
| 24           | FRAME-CASSETTE       | JC72-41183A  | 1    | X      |
| 25           | PMO-GUIDE REAR       | JC72-41180A  | 1    | X      |

6-9. Second Cassette Frame Exploded View



**Second Cassette Frame Parts Lists**

| Location No. | Description          | SEC. Code   | Q'ty | Remark |
|--------------|----------------------|-------------|------|--------|
| 0            | ELA HOU-SCF(ML-6050) | JC96-01268A | 1    | X      |
| 1            | E-RING               | 6044-000126 | 4    | X      |
| 2            | BEARING ROLLER IDLER | JC66-10304A | 2    | X      |
| 3            | TAPTITE SCREW        | 6003-000179 | 23   | X      |
| 4            | TAPTITE SCREW        | 6003-000344 | 4    | X      |
| 5            | FOOT RUBBER          | JC61-40301A | 4    | X      |
| 6            | GUIDE INNER UPPER    | JC72-40307B | 1    | X      |
| 7            | GEAR-FEED            | JC66-40014A | 1    | X      |
| 8            | ROLLER-INNER UPPER   | JC75-10028A | 1    | X      |
| 9            | E-RING               | 6044-000125 | 5    | X      |
| 10           | GEAR DOUBLE OPTION   | JC66-40363A | 1    | X      |
| 11           | BRKT MOTOR (SCF)     | JC70-10986A | 1    | X      |
| 12           | STEP MOTOR           | 3101-001158 | 1    | X      |
| 13           | SHIELD-PCB           | JC70-10451A | 1    | X      |
| 14           | COVER-LEFT           | JC72-40368B | 1    | X      |
| 15           | TAPTITE SCREW        | 6002-000194 | 9    | X      |
| 16           | MACHINE SCREW        | 6001-000131 | 4    | X      |
| 17           | SOLENOID-MAGNET      | JC33-10001A | 1    | X      |
| 18           | HUB CLUTCH           | JC72-40587A | 1    | X      |
| 19           | SPRING-TS,CLUTCH     | JC61-70331A | 1    | X      |
| 20           | GEAR IDLER OPTION    | JC66-40365A | 1    | X      |
| 21           | GEAR IDLE Z19        | JC66-40012A | 2    | X      |
| 22           | GUIDE RAIL           | JC72-40371A | 2    | X      |
| 23           | BEARING-FEED         | JC72-40531A | 2    | X      |
| 24           | GEAR P/UP OPTION     | JC66-40364A | 1    | X      |
| 25           | COLLAR CLUTCH P1     | JC72-40569B | 1    | X      |
| 26           | CBF HARNESS          | JC39-40544A | 1    | X      |
| 27           | PBA MAIN             | JC92-01077A | 1    | X      |
| 28           | CBF HARNESS          | JC39-40305A | 1    | X      |
| 29           | LABEL WARNING        | JC68-20417A | 1    | X      |
| 30           | LABEL(R)-SCF(12)     | JC68-30936A | 1    | X      |
| 31           | COVER-REAR           | JC72-40362B | 1    | X      |
| 32           | FRAME UPPER          | JC70-10027A | 1    | X      |
| 33           | FRAME LEFT(SCF)      | JC70-10023A | 1    | X      |
| 34           | ACTUATOR-ARM         | JC72-40370A | 1    | X      |
| 35           | CS STOP RING         | 6044-000001 | 1    | X      |
| 36           | PIN PARELLED,P/U     | JC70-40360A |      | X      |
| 37           | STOPPER-SCF          | JC72-41347A | 1    | X      |



| Location No. | Description      | SEC. Code   | Q'ty | Remark |
|--------------|------------------|-------------|------|--------|
| 38           | MACHINE SCREW    | 6001-001532 | 2    | X      |
| 39           | FRAME LOWER      | JC70-11065A | 1    | X      |
| 40           | SHAFT PICKUP     | JC70-40002A | 1    | X      |
| 41           | IDLE-SCF         | JC72-41348A | 1    | X      |
| 42           | HODER-HOUSING    | JC72-40654A | 1    | X      |
| 43           | RUBBER P/UP      | JC73-40907A | 1    | X      |
| 44           | BRKT SUPPORT     | JC70-10461A | 2    | X      |
| 45           | COVER-RIGHT      | JC72-40367B | 1    | X      |
| 46           | TAPTITE SCREW    | 6003-000205 | 1    | X      |
| 47           | GROUND ROLLER    | JC70-10467A | 1    | X      |
| 48           | FRAME RIGHT(SCF) | JC70-10022A | 1    | X      |
| 49           | MACHINE SCREW    | 6001-000153 | 2    | X      |
| 50           | CABLE CLAMP      | 6502-000003 | 1    | X      |

## 5. Troubleshooting

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### Error code 1-010

| Fault   | Black vertical stripes | Model | ML-xxxx |
|---|------------------------|-------|---------|
| <b>Description</b><br>Black vertical stripes occur in the printing.   |                        |       |         |
| <b>Check</b><br><ol style="list-style-type: none"><li>1. Developer cartridge</li><li>2. Transfer roller</li><li>3. Charge roller</li></ol>  |                        |       |         |
| <b>Cause</b><br><ol style="list-style-type: none"><li>1. Defective develop roller or bad blade of toner cartridge.</li><li>2. Defective transfer roller or charge roller.</li></ol> |                        |       |         |
| <b>Solution</b><br><ol style="list-style-type: none"><li>1. Replace the toner cartridge, if defective.</li><li>2. Replace the roller defective.</li></ol>                           |                        |       |         |
| <b>Remark</b>   |                        |       |         |
| <b>Others</b>   |                        |       |         |

## Error code 1-020

| Fault   | White vertical stripes | Model | ML-xxxx |
|---|------------------------|-------|---------|
| <b>Description</b><br>White vertical voids in the image.  |                        |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. LSU</li> <li>2. Developer cartridge</li> <li>3. Fuser</li> </ol>   |                        |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Foreign matter stuck onto the window of internal lens of LSU mirror</li> <li>2. Foreign matter or toner particles between the developer roller and blade</li> <li>3. If the fuser is defective, voids occur periodically at the top of a black image.</li> </ol> |                        |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Clean the LSU window with a recommended cleaner, or replace the LSU window.</li> <li>2. Replace the developer cartridge if defective.</li> <li>3. Open rear cover and check ribs in the fuser for contamination. Clean if necessary.</li> </ol>               |                        |       |         |
| <b>Remark</b><br>Use LSU cleaner dated after January 1997.  |                        |       |         |
| <b>Others</b><br>If white streaks occurs fewer than 5 or 6 times, it can be considered as normal.   |                        |       |         |

## Error code 1-030

| Fault  | Black horizontal stripes | Model | ML-xxxx |
|--|--------------------------|-------|---------|
| <b>Description</b><br>Dark or blurry horizontal stripes occur in the printing periodically.  |                          |       |         |
| <b>Check</b><br>Developer cartridge  |                          |       |         |
| <b>Cause</b><br>1. Bad contacts of the voltage terminals to developer<br>2. The rollers may be stained with toner particles.<br>* Abnormal image periodicity :<br>37.7 mm = Charge roller<br>31.3 mm = Supply roller<br>94.2 mm = OPC drum<br>46 mm = Develop roller<br>non periodical = Blade |                          |       |         |
| <b>Solution</b><br>1. Check all voltages, and adjust as necessary.<br>2. Check for terminal contacts, and replace the cartridge, if necessary.   |                          |       |         |
| <b>Remark</b>  |                          |       |         |
| <b>Others</b>  |                          |       |         |

## Error code 1-040

| Fault  | Black or white spots | Model | ML-xxxx |
|--|----------------------|-------|---------|
| <b>Description</b><br>Dark or blurry black or white spots occur periodically.  |                      |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Developer cartridge</li> <li>2. Transfer voltage</li> <li>3. Transfer roller's life</li> </ol>  |                      |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. If dark or blurry black spots occur periodically, the rollers in the Developer may be contaminated with foreign matter or paper particles.<br/>(Charge roller : 37 mm interval, OPC drum : 94 mm interval).</li> <li>2. If faded areas or voids occur in a black image at intervals of 94 mm, or black spots occur elsewhere, the OPC drum surface is damaged.</li> <li>3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.</li> </ol> |                      |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Run OPC cleaning to remove excess toner and paper particles on the charge roller and OPC drum. Repeat 2 or 3 times. Run the self-test. If the same problem persists, replace the developer.</li> <li>2. Clean the rollers. If problem persists, replace the Developer.</li> <li>3. The transfer roller guarantees 50,000 sheets printing. If the roller's life is expired, replace it.</li> </ol>  |                      |       |         |
| <b>Remark</b>  |                      |       |         |
| <b>Others</b>  |                      |       |         |

## Error code 1-050

| Fault   | Light image (1) | Model | ML-xxxx |
|---|-----------------|-------|---------|
| <b>Description</b><br>The printed image is light, with no ghost.  |                 |       |         |
| <b>Check</b><br>Developer cartridge   |                 |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. The life of cartridge is ended.</li> <li>2. Ambient temperature is below than 10 °C.</li> <li>3. Agitator gear in the Developer is defective.</li> <li>4. Bad contact of supply roller and abnormal supply voltage.</li> </ol>   |                 |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Check the weight of the developer cartridge, and replace if necessary. When the cartridge is almost used up, the weight will be as follows:<br/>ML+6000D5 : 960 grams +/- 20 grams</li> <li>2. In low temperature, wait 30 minutes after printer is powered on before you start printing.</li> <li>3. Check if the hopper gear is visible from the side of the developer. If not, replace the developer.</li> <li>4. Check for the supply roller contact and the supply voltage.</li> </ol> |                 |       |         |
| <b>Remark</b>   |                 |       |         |
| <b>Others</b>   |                 |       |         |

## Error code 1-051

| Fault   | Light image (2) | Model | ML-xxxx |
|---|-----------------|-------|---------|
| <b>Description</b><br>The printed image is light, with no ghost.  |                 |       |         |
| <b>Check</b><br>Engine board  |                 |       |         |
| <b>Cause</b><br>1. Charge voltage (=MHV) on the engine board exceeds 1520V. (Perform DCU diagnostic mode 01 to measure the voltage).<br>2. No power to the supply roller.   |                 |       |         |
| <b>Solution</b><br>Check the following parts and replace if defective :<br>U201(KA324), Q211(C1008), T202(Transformer),<br>resistors, and diodes in the output and feedback area.   |                 |       |         |
| <b>Remark</b><br>Check the charge voltage (MHV) at :<br>U201; while operating, #10/#9 2.5~2.9V, #8 5.5~8.5V<br>while idling, #9 2.7V, #10/#8 0V<br>Q201 operating voltage; Base 2~2.5V, Emitter 0~1V, Collector 30~60V<br>U203; #1 0V input, #2 0V output |                 |       |         |
| <b>Others</b>   |                 |       |         |

## Error code 1-052

| Fault  | Light image (3) | Model | ML-xxxx |
|--|-----------------|-------|---------|
| <b>Description</b><br>The printed image is light, with no ghost.   |                 |       |         |
| <b>Check</b><br>1. Engine board<br>2. Main body  |                 |       |         |
| <b>Cause</b><br>1. Engine board bias (350-485V) and supply voltage (570-630V) may be low (Perform DCU diagnostic mode 04 to measure the voltage).<br>2. Direct strong light may be entered into the manual feed slot.  |                 |       |         |
| <b>Solution</b><br>1. Check the following parts :<br>U201(KA324), Q204(D526-Y), T204(Transformer), U203(SN7407N), resistors, diodes in the output and feedback area.<br>2. Check if contrast mode is set to 'Light'. If not, change the install position of the printer or attach OPC cover sheet (P/No: JC72-49093A). |                 |       |         |
| <b>Remark</b><br>Bias and supply voltage check point:<br>U203; #9 pulse input, #8 pulse output   |                 |       |         |
| <b>Others</b>  |                 |       |         |



## Error code 1-060

| Fault   | Dark image (1) | Model | ML-xxxx |
|---|----------------|-------|---------|
| <b>Description</b><br>The printed image is dark.  |                |       |         |
| <b>Check</b><br>Engine board  |                |       |         |
| <b>Cause</b><br>1. No charge voltage in the engine board. (Perform DCU diagnostic code '01' to measure the voltage).  |                |       |         |
| <b>Solution</b><br>1-1. Check the following parts :<br>U201(KA324), Q211(C1008), Q201(D526-Y), T202, U203 (SN7407N),<br>resistors, diodes in the output and feedback area.<br>1-2. Clean the high voltage terminal on the engine and its PBA.<br>1-3. Refer to the following information.<br>U201(KA324)'s pin #12, #13 ; 2.5~2.9 V, pin #14 ; 5.5~8.5 V<br>For standby, pin #13 ; 2.7V, pin #12 & #14 ; 0V<br>Q201's operating voltage ; base=+2~2.5 V, emitter=0~1 V collector=30~60 V<br>U203(7407N)'s pin #1 ; 0V input, pin #2 ; 0V output |                |       |         |
| <b>Remark</b>   |                |       |         |
| <b>Others</b>   |                |       |         |

## Error code 1-061

| Fault   | Dark image (2) | Model | ML-xxxx |
|---|----------------|-------|---------|
| <b>Description</b><br>The printed image is dark.  |                |       |         |
| <b>Check</b><br>Engine board  |                |       |         |
| <b>Cause</b><br>1. No supply or bias voltage at the engine board<br>(Perform DCU diagnostic code '04' to measure the voltage).  |                |       |         |
| <b>Solution</b><br>1-1. Check the following parts :<br>U201(KA324), Q204(D526-Y), T204, U203 (SN7407N),<br>resistors, diodes in the output and feedback area.<br>1-2. Refer to the following information.<br>U203(7407N)'s pin #1; pulse input, pin #2; pulse output. |                |       |         |
| <b>Remark</b>   |                |       |         |
| <b>Others</b>   |                |       |         |

## Error code 1-062

| Fault   | Dark image (3) | Model | ML-xxxx |
|---|----------------|-------|---------|
| <b>Description</b><br>The printed image is dark.  |                |       |         |
| <b>Check</b><br>Engine board  |                |       |         |
| <b>Cause</b><br>1. Voltage higher than normal. (normal supply voltage : 570-630V, normal bias voltage : 350-485V).  |                |       |         |
| <b>Solution</b><br>1-1. Check the following parts :<br>U201(KA324), Q204(D526-Y), T204, U203 (SN7407N)<br>resistors, diodes in the output and feedback area.<br><br>1-2. Refer to the following information.<br>U203(7407N)'s pin #9; pulse input, pin #8; pulse output.<br><br>1-3. Check developer contacts for contamination by toner particles. |                |       |         |
| <b>Remark</b>   |                |       |         |
| <b>Others</b>   |                |       |         |

## Error code 1-070

| Fault  | Uneven density | Model | ML-xxxx |
|--|----------------|-------|---------|
| <b>Description</b><br>Print density is uneven between left and right.  |                |       |         |
| <b>Check</b><br>1. Transfer roller pressure<br>2. Developer cartridge  |                |       |         |
| <b>Cause</b><br>1. The pressure force on the left and right springs of the transfer roller is not even (left : 450 gf, right : 600 gf), the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holder is damaged.<br>2. The toner level is not even on the developer roller due to the bad blade. |                |       |         |
| <b>Solution</b><br>1. Replace defective holder or springs. Adjust the transfer voltage.<br>2. Replace the developer cartridge.   |                |       |         |
| <b>Remark</b>  |                |       |         |
| <b>Others</b>  |                |       |         |

## Error code 1-080

| Fault   | Background | Model | ML-xxxx |
|---|------------|-------|---------|
| <b>Description</b><br>Background appears in the printing.   |            |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Engine board</li> <li>2. Developer cartridge</li> <li>3. Transfer roller</li> <li>4. Operating environment</li> </ol>  |            |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1-1. Low transfer voltage (10% below than normal)</li> <li>1-2. High supply and / or bias voltage.</li> <li>1-3. No transfer voltage.</li> <li>2. Unauthorized recording paper has been used.</li> <li>3. Abnormal ambient temperature or humidity.</li> <li>4. Defective develop roller.</li> </ol>  |            |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1-1. Refer to Error Code 1-060.</li> <li>1-2. Refer to Error Code 1-061.</li> <li>1-3. Refer to Error Codes 1-090 and 1-091.</li> <li>2. Use a recommended type of recording paper.</li> <li>3. If the printer is under abnormal ambient condition for a long time, print errors may occur. Improve the operating environment.</li> <li>4. Replace the toner cartridge.</li> </ol> |            |       |         |
| <b>Remark</b>   |            |       |         |
| <b>Others</b>   |            |       |         |

## Error code 1-090

| Fault  | Ghost (1) | Model | ML-xxxx |
|--|-----------|-------|---------|
| <b>Description</b><br>Ghost occurs at 94 mm intervals.   |           |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Developer cartridge</li> <li>2. Main body</li> </ol>  |           |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Contamination of high voltage terminals in the main body , engine board, and / or developer.</li> <li>2. Transfer roller lifetime has expired.</li> <li>3. No using recommended recording paper.</li> <li>4. The Pre-Transfer Lamp (Refer to ⑱ on page 6-6.)</li> </ol>   |           |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Open top cover and disassemble the unit and clean contamination components.</li> <li>2. After replacing the transfer roller, make sure the transfer voltage is normal.</li> <li>3. Use a recommended type of recording paper.</li> <li>4. Check for the PTL operation, and if required, check for the main board.</li> </ol> |           |       |         |
| <b>Remark</b>  |           |       |         |
| <b>Others</b>  |           |       |         |

## Error code 1-090-1

| Fault   | Ghost (2) | Model | ML-xxxx |
|---|-----------|-------|---------|
| <b>Description</b><br>Ghost occurs at 94 mm intervals.  |           |       |         |
| <b>Check</b><br>Operating environment   |           |       |         |
| <b>Cause</b><br>1. Abnormal low temperature and humidity. In this case, ghost occurs on the entire page and the print density is too light.         |           |       |         |
| <b>Solution</b><br>1. If the operating temperature and relative humidity are too low, try waiting about 1 hour after power on before using printer. |           |       |         |
| <b>Remark</b>   |           |       |         |
| <b>Others</b>   |           |       |         |

## Error code 1-091

| Fault   | Ghost (3) | Model | ML-xxxx |
|---|-----------|-------|---------|
| <b>Description</b><br>When xerographic paper is used in ADF, ghost occurs at 94 mm intervals.   |           |       |         |
| <b>Check</b><br>Engine board  |           |       |         |
| <b>Cause</b><br>1. No minus (-) transfer voltage output from the engine board.<br>(Normal voltage : 1250 -1450V with 660 Mohm load)<br><br>2. The (+) transfer voltage may be abnormal when performing DCU #13 with 660 Mohm load on the transfer voltage output. (Normal voltage: 2200V (+30/-30V) DCU #14, 3250-3350V DCU #13). |           |       |         |
| <b>Solution</b><br>Check the following parts :<br>U201(KA324), Q207(A708), Q202(KSD526-Y), T201, U203 (SN7407),<br>resistors, or diodes in the output and feedback area.  |           |       |         |
| <b>Remark</b>   |           |       |         |
| <b>Others</b><br>In case of no minus transfer output voltage, image quality may be poor, and background may occur in the printing.  |           |       |         |



## Error code 1-093

| Fault   | Ghost (4) | Model | ML-xxxx |
|---|-----------|-------|---------|
| <b>Description</b><br>When printing on card stock or transparencies using manual feeder, ghost occurs at 94 mm intervals.   |           |       |         |
| <b>Check</b><br>1. Selected paper type in the software application<br>2. Engine board   |           |       |         |
| <b>Cause</b><br>1. When printing on card stock or transparencies, higher transfer voltage is required. Select 'Thick Mode' on paper type menu from the software application.<br>2. Defective transfer voltage terminal in the engine board. |           |       |         |
| <b>Solution</b><br>1. Select 'Thick Mode' on paper type menu from software application to print on card stock or transparencies.<br>2. If the transfer voltage in the engine board is out of specification, refer to Error Code 1-091       |           |       |         |
| <b>Remark</b>   |           |       |         |
| <b>Others</b>   |           |       |         |

## Error code 1-094

| Fault  | <b>Ghost (5)</b> | Model | ML-xxxx |
|--|------------------|-------|---------|
| <b>Description</b><br>Dark ghost occurs in printing at 69 mm intervals   |                  |       |         |
| <b>Check</b><br>Fuser  |                  |       |         |
| <b>Cause</b><br>The heat roller and pressure roller in the fuser are contaminated with toner or paper particles.   |                  |       |         |
| <b>Solution</b><br>Open the rear cover and check if the heat roller is stained. If stained, disassemble the fuser and clean the rollers with soft cloth dampened with alcohol. If ghost still occurs, replace the fuser. |                  |       |         |
| <b>Remark</b>  |                  |       |         |
| <b>Others</b>  |                  |       |         |

## Error code 1-095

| Fault  | Ghost (6) | Model | ML-xxxx |
|--|-----------|-------|---------|
| <b>Description</b><br>White ghost occurs in the black image printing at 46 mm intervals.   |           |       |         |
| <b>Check</b><br>1. Developer cartridge   |           |       |         |
| <b>Cause</b><br>1. The life of the developer may be expired.<br>2. Abnormal transfer voltage or bad contact of the transfer roller   |           |       |         |
| <b>Solution</b><br>1. Measure the weight of the developer and replace if the weight is less than 960g +/-20g.<br>2. Check the supply voltage and adjust if necessary. Check for the contact. |           |       |         |
| <b>Remark</b>  |           |       |         |
| <b>Others</b>  |           |       |         |

## Error code 1-100

| Fault   | Partial blank image | Model | ML-xxxx |
|---|---------------------|-------|---------|
| <b>Description</b><br>Partially blank image appears either periodically or non-periodically.  |                     |       |         |
| <b>Check</b><br>1. Transfer roller<br>2. Developer cartridge  |                     |       |         |
| <b>Cause</b><br>1. The pressure force on the left and right transfer roller springs are not even, the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holder is damaged.<br>2. If a black image prints light or gradually light at intervals of 49 mm, the transfer roller is defective.<br>3. If there is a partial blank image on left and right side of the page:<br>1) The life of the transfer roller has expired.<br>2) Abnormal transfer voltage.<br>3) The life of the developer has expired. |                     |       |         |
| <b>Solution</b><br>1. Replace the defective components.<br>2. Replace the transfer roller.<br>3-1. Replace the transfer roller.<br>3-2. Measure the transfer voltage. If the voltage is abnormal, disassemble the main board and clean the components stained with toner or paper particles.<br>3-3. Measure the weight of the developer. If the weight is less than 960 g $\pm$ 20 g, replace the developer.   |                     |       |         |
| <b>Remark</b>   |                     |       |         |
| <b>Others</b>   |                     |       |         |

## Error code 1-110

| Fault  | Stains on the face of page | Model | ML-xxxx |
|--|----------------------------|-------|---------|
| <b>Description</b><br>Background too dark on the face of printed page  |                            |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Developer cartridge</li> <li>2. Main body</li> </ol>  |                            |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Toner leakage due to improperly sealed developer.</li> <li>2. Transfer roller length is out of spec. (218 mm) or the roller is defective.</li> <li>3. The inside of the unit is contaminated with toner or paper particles.</li> </ol>                        |                            |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Clean the unit thoroughly. If problems still occurs, replace the developer.</li> <li>2. If the roller is shorter than the recording paper or the roller is severely stained, replace the roller.</li> <li>3. Clean the contaminated components.</li> </ol> |                            |       |         |
| <b>Remark</b>  |                            |       |         |
| <b>Others</b>  |                            |       |         |

## Error code 1-111

| Fault   | Stains on back of page | Model | ML-xxxx |
|---|------------------------|-------|---------|
| <b>Description</b><br>The back of the page is stained at 49 mm intervals  |                        |       |         |
| <b>Check</b><br>Transfer roller   |                        |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Transfer roller is contaminated.</li> <li>2. Abnormal (+) (-) transfer voltage, or cleaning voltage.</li> <li>3. Defective transfer roller</li> </ol>    |                        |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Clean the transfer roller thoroughly. Replace if contaminated severely.</li> <li>2. Adjust the voltages.</li> <li>3. Replace if necessary.</li> </ol> |                        |       |         |
| <b>Remark</b>   |                        |       |         |
| <b>Others</b>   |                        |       |         |

## Error code 1-120

| Fault  | Blank page printout | Model | ML-xxxx |
|--|---------------------|-------|---------|
| <b>Description</b><br>Blank page is printed.   |                     |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Bad ground contacts in OPC and/ or developer.</li> <li>2. Seal tape on the cartridge</li> </ol>   |                     |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. GND OPC is not well grounded.</li> <li>2. Seal tape is not removed.</li> <li>3. Low toner</li> </ol>  |                     |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Repair or replace the GND terminal.</li> <li>2. Remove the seal tape.</li> <li>3. Shake the toner cartridge and print. Or replace with new one.</li> </ol> |                     |       |         |
| <b>Remark</b>  |                     |       |         |
| <b>Others</b>  |                     |       |         |

## Error code 1-121

| Fault  | Partial black image | Model | ML-xxxx |
|--|---------------------|-------|---------|
| <b>Description</b><br>One or several blank pages are printed.<br>When the printer turns on, several blank pages print.   |                     |       |         |
| <b>Check</b><br>Control board  |                     |       |         |
| <b>Cause</b><br>Defective control board  |                     |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Perform the engine self test using DCU. If blank page prints, the control board is defective. If the printer works normally, refer to next solution (2). If the control board is defective, check the connection on the control board, QP1700 pin 125, and 202.</li> <li>2. If blank page is printed one time or continuously, check that the video controller oscillates properly at 47.7789 MHz. (lower than 0.75V, higher than 3.5V)</li> <li>3. If blank pages prints continuously when the printer turns on, check the CPU works properly, and replace if defective.</li> </ol> |                     |       |         |
| <b>Remark</b>  |                     |       |         |
| <b>Others</b>  |                     |       |         |



## Error code 1-130

| Fault   | Data error | Model | ML-xxxx |
|---|------------|-------|---------|
| <b>Description</b><br>Incomplete or missing characters.   |            |       |         |
| <b>Check</b><br>Control board   |            |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Bad connections of port</li> <li>2. Defective oscillators in the video controller.</li> <li>3. Defective CPU in the video controller.</li> </ol>   |            |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Check that the port and related parts are properly connected or soldered.</li> <li>2. Check the oscillators (47.7789 MHz, 50MHz) on the video controller.</li> <li>3. Replace the CPU on the video controller.</li> </ol> |            |       |         |
| <b>Remark</b>   |            |       |         |
| <b>Others</b>   |            |       |         |

## Error code 1-140

| Fault  | Poor fusing grade (1) | Model | ML-xxxx |
|--|-----------------------|-------|---------|
| <b>Description</b><br>When printing on xerographic paper from cassette, the printed image is diffused. |                       |       |         |
| <b>Check</b><br>Engine board   |                       |       |         |
| <b>Cause</b><br>Defective the fuser (Heat lamp) control circuit in the engine board.                   |                       |       |         |
| <b>Solution</b><br>Refer to solution 2-1 under Error Code 3-011.                                       |                       |       |         |
| <b>Remark</b>  |                       |       |         |
| <b>Others</b>  |                       |       |         |

## Error code 1-141

| Fault   | Poor fusing grade (2) | Model | ML-xxxx |
|---|-----------------------|-------|---------|
| <b>Description</b><br>When printing on card stock or transparencies using manual feeder, the printed image is diffused.   |                       |       |         |
| <b>Check</b><br>1. Improper paper type menu setup<br>2. Engine board  |                       |       |         |
| <b>Cause</b><br>1. When printing on card stock or transparencies, higher transfer voltage is required.<br>2. Defective transfer voltage circuit in the engine board.  |                       |       |         |
| <b>Solution</b><br>1-1. Select 'Thick Mode' on paper type menu from the software application to print on card stock or transparencies.<br>1-2. Check the fuser control circuit. Refer to Solution 2-1 under Error Code 3-011.<br>2. Check the transfer voltage and adjust if necessary. |                       |       |         |
| <b>Remark</b>   |                       |       |         |
| <b>Others</b>   |                       |       |         |

## Error code 2-010

| Fault   | Wrong print position | Model | ML-xxxx |
|---|----------------------|-------|---------|
| <b>Description</b><br>Printing begins at wrong position on the paper.   |                      |       |         |
| <b>Check</b><br>Feed sensor actuator, LSU, Pick-up ass'y, Bracket-dust, Solenoid, Video Controller.   |                      |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Wrong sense time caused by defective feed sensor actuator.</li> <li>2. Skew:               <ul style="list-style-type: none"> <li>Bad LSU-assembling</li> <li>Uneven pressure force of the pick-up ass'y</li> <li>Defective mechanical parts</li> </ul> </li> <li>3. Top margin;               <ul style="list-style-type: none"> <li>Early feeding by the solenoid</li> <li>Wrong OP1 sensor position</li> <li>Wrong video controller connection</li> </ul> </li> </ol> |                      |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Replace the defective actuator.</li> <li>2. Reassemble or replace the LSU.<br/>               Reassemble or replace the pick-up ass'y.<br/>               Reassemble or replace the defective mechanical parts. (for example, Bracket-dust).</li> <li>3. Replace the solenoid.<br/>               Check OP1.<br/>               Check the Video Controller or its connection.</li> </ol>  |                      |       |         |
| <b>Remark</b>   |                      |       |         |
| <b>Others</b>   |                      |       |         |

## Error code 2-020

| Fault   | Jam 0 | Model | ML-xxxx |
|---|-------|-------|---------|
| <b>Description</b> <ol style="list-style-type: none"> <li>1. Paper is not exited from the cassette.</li> <li>2. Paper is stopped just after cassette, before feed sensor, or on the feed sensor.</li> </ol>   |       |       |         |
| <b>Check</b><br>Engine board  |       |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Open the printer cover, and close it. Then check : <ol style="list-style-type: none"> <li>1-1. If the paper does not feed into the printer, the feed clutch driving circuit in the engine board may be defective.</li> <li>1-2. If the paper feeds into the printer and 'Jam 0' occurs, the feed sensor OP1 on the engine board may be defective.</li> </ol> </li> <li>2. Defective PLT-Knockup (12) (Refer to ⑨ on page 6-14.)</li> </ol>   |       |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Check for the solenoid driving circuit using DCU diagnostic mode 06. <ol style="list-style-type: none"> <li>1) Check for 24V input on D1 cathode. If 24V is not present, check Q4. If they work normally, check for 24V output from SMPS.</li> <li>2) Measure the feed clutch resistance. Replace if not approximately 60 ohms.</li> <li>3) Check Q4. if Q4 is OK, the collector and base should be 0V and 0.7V DC to GND, respectively.</li> </ol> </li> <li>2. Check for Feed sensor OP1 and related parts. <ol style="list-style-type: none"> <li>1) Replace Feed sensor actuator if defective.</li> <li>2) When OP1 sensor is blocked, U6 (74HC245) pin#16 should be over 3.5V. When the sensor is not blocked, the pin should be below 0.7V.<br/>One side of R15 in OP1 transmitter should be 5V, and the other end 1.2V. If normal, check OP1 receiver. If not shorted, replace CPU.</li> </ol> </li> <li>3. Replace the cassette, if damaged.</li> </ol> |       |       |         |
| <b>Remark</b>   |       |       |         |
| <b>Others</b>   |       |       |         |

## Error code 2-030

| Fault  | Jam 1 | Model | ML-xxxx |
|--|-------|-------|---------|
| <b>Description</b><br>Recording paper is jammed in the output area (inside the fuser), or multiple sheets of the paper are fed at once.  |       |       |         |
| <b>Check</b><br>Engine board   |       |       |         |
| <b>Cause</b><br>1. Open the printer cover, and close it. Then check : <ul style="list-style-type: none"> <li>- If the paper does not feed into the printer, the feed clutch driving circuit in the engine board may be defective.</li> <li>- If the paper feeds into the printer and 'Jam 1' occurs, the feed sensor OP1 on the engine board may be defective.</li> <li>- If paper is stopped in just front of fuser:</li> </ul> 1-1. Feed sensor OP1 or feed actuator may be defective.<br>1-2. Exit sensor OP3 or exit actuator may be defective.<br>2. In case of multi-feeding, refer to Error Code 2-050. |       |       |         |
| <b>Solution</b><br>1-1. Check the feed sensor OP1. Refer to Error Code 2-020. Replace the feed actuator if defective.<br>1-2. Check OP contacts. In operating mode, U6 (74HC245) pin#13 should be below 0.7V. If not, check OP3 contact resistance. Replace OP3 if over 100 ohms. If the switch works normally, check R30. If defective, replace the exit sensor actuator.<br>2. In case of multi feeding, refer to Error Code 2-050.  |       |       |         |
| <b>Remark</b>  |       |       |         |
| <b>Others</b>  |       |       |         |

## Error code 2-040

| Fault  | Jam 2 | Model | ML-xxxx |
|--|-------|-------|---------|
| <b>Description</b><br>Paper is completely fed out of the printer, but Jam 2 occurs. Or, the paper is stuck in the fuser roller.  |       |       |         |
| <b>Check</b><br>1. Engine board<br>2. Fuser  |       |       |         |
| <b>Cause</b><br>1. Check if paper is jammed in the pressure roller.<br>2. Open the printer cover, and close it :<br>If Jam 2 occurs after the paper is completely fed out of the printer, the exit sensor contact may be bad or the exit sensor actuator may be deformed.  |       |       |         |
| <b>Solution</b><br>1-1. Check if the exit sensor actuator is defective, and replace if required.<br>1-2. Check the exit sensor OP3 contact and related parts. Refer to Error Code 2-030.<br>2. If the paper is stuck in the fuser, disassemble the fuser and remove the jammed paper, and clean the surface of the pressure roller with soft cloth, dampened with alcohol. |       |       |         |
| <b>Remark</b>  |       |       |         |
| <b>Others</b>  |       |       |         |

## Error code 2-050

| Fault  | Multi-feeding | Model | ML-xxxx |
|--|---------------|-------|---------|
| <b>Description</b><br>Multiple sheets of paper are fed at once.  |               |       |         |
| <b>Check</b><br>Engine board   |               |       |         |
| <b>Cause</b><br>1. Solenoid malfunction.<br>2. Feed clutch armature does not engage the pick-up housing in the pick-up ass'y.  |               |       |         |
| <b>Solution</b><br>1. If the solenoid does not work properly:<br>1-1. Measure the resistance of the feed clutch coil. If below 40 ohm (normal: 55-60 ohm), replace.<br>1-2. Check Q4 C/E short, and replace as necessary. (If C and E are shorted, multiple sheets of paper feed when the printer powers on.)<br>1-3. Check if the solenoid spring is returned to the original state. Replace if the return force is weak.<br>2. If the clutch works properly, but the armature does not engage the pick-up housing in the pick-up ass'y, bend the armature to pick up properly. |               |       |         |
| <b>Remark</b><br>The feed clutch spring has 40 turns. A pad is attached to solenoid yoke, the armature angle is 90 degrees.  |               |       |         |
| <b>Others</b>  |               |       |         |



## Error code 3-010

| Fault  | Fuser Error | Model | ML-xxxx |
|--|-------------|-------|---------|
| <b>Description</b><br>All the lamps on the operator panel blink and the system stops.  |             |       |         |
| <b>Check</b><br>1. Fuser<br>2. Engine board  |             |       |         |
| <b>Cause</b><br>1-1. Thermostat, AC wire, or heat lamp may be open.<br>1-2. Thermistor may be open. (DCU error code 60, 62, 68.)<br>2-1. Abnormal heat lamp on/off<br>2-2. Malfunction of the overheat circuit   |             |       |         |
| <b>Solution</b><br>1-1. Check thermostat, AC wire, and heat lamp. If the thermostat is open, check also R37, R47, or Q8.<br>1-2. If thermistor is open, check the wire. If the wire is good, check Q8. Q8 collector should be 0.2V, base 0.7V.<br>2-1. Check Q3 and its related parts in the order shown below.<br>1) Check Q3 C-E, B-E, B-C, and replace if shorted. If the voltage between B and E is below 0.7V, replace the transistor.<br>2) When lamp is on, if the base is 0V, check CPU pin 38.<br>3) When lamp is on, if the collector is 0V with lamp off, check PC151, Q101, and its related parts.<br>2-2. Check the overheat circuit. When U5 pin 7 is below 0.5V, the overheat circuit should activate and the lamp turns off. In normal mode, pin 6 is approximately 2.6V, pin 5 is over 2.6V, and pin 7 is over 4V. If not, check all related parts. |             |       |         |
| <b>Remark</b>  |             |       |         |
| <b>Others</b>  |             |       |         |

## Error code 3-011

| Fault   | Malfunction of the gear motor in the fuser | Model | ML-xxxx |
|---|--|-------|---------|
| <b>Description</b><br>When printing, motor breaks away from its place due to the defective fuser gear.  |  |       |         |
| <b>Check</b><br>1. Fuser<br>2. Engine board   |  |       |         |
| <b>Cause</b><br>1. Fuser control temperature is set too high.<br>2. PC151 or Q3 is defective.<br>3. Overheat circuit is not operating properly.   |  |       |         |
| <b>Solution</b><br>1-1. Check if the thermostat is open, and replace.<br><br>1-2. Check if the thermistor sensor is in place, and replace if required.<br><br>2-1. R57 and R58 = 3.3k and 1k, respectively.<br>Check if R57 and R58 are 3.3K and 1K respectively.<br>2-2. Replace Q3 if C and E are short.<br>2-3. Replace PC151 if pin 4 and 6 are short.<br>2-4. Replace Q101 if T1 and T2 are short.<br>3. Check if the overheat circuit works properly :<br>Refer to the solution 2-2 under 'Error Code 3-010'. |  |       |         |
| <b>Remark</b>   |  |       |         |
| <b>Others</b>   |  |       |         |

## Error code 3-020

| Fault  | Scanner Error | Model | ML-xxxx |
|--|---------------|-------|---------|
| <b>Description</b><br>The feeding paper is stopped in the front of transfer roller and all lamps on the operator panel blink.  |               |       |         |
| <b>Check</b><br>1. LSU<br>2. Engine board  |               |       |         |
| <b>Cause</b><br>1. Defective LSU<br>2. Defective Q5, or CPU<br>3. Abnormal resistance value of R8, R62   |               |       |         |
| <b>Solution</b><br>1. Perform DCU diagnostic code 05. If the DCU error code 95 is displayed, replace LSU.<br>If you cannot solve the problem after you replace LSU, follow the steps below.<br><br>(1) When you press ENTER key with DCU code '05', if the LSU motor does not run, check U205 pin 5, pin 6. If U205 pin 5, and pin 6 are normal, check CPU pin 40 and the related parts.<br>If the motor drives properly, and CPU pin 25 is not below 0.5V, replace R51 and CPU.<br><br>(2) When you press UP key with DCU code '05', if ON and OFF lamps do not turn on, check CPU pin 28 and 41, and their related parts. Normally pin 28 is over 3.5V when high, and below 0.7V when low. If the transformer works normally, replace CPU. |               |       |         |
| <b>Remark</b>  |               |       |         |
| <b>Others</b><br>Q3, U3, CN3, SW151  |               |       |         |

## Error code 3-030

| Fault  | Paper Empty | Model | ML-xxxx |
|--|-------------|-------|---------|
| <b>Description</b> <ul style="list-style-type: none"> <li>• The PAPER lamp on the operator panel is on even when paper is loaded in the cassette.</li> <li>• The PAPER lamp on the operator panel does not come on when the paper cassette is empty.</li> </ul>  |             |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Actuator-Empty (Refer to ⑤2 on page 6-6.)</li> <li>2. Engine board</li> </ol>   |             |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Empty actuator may be defective.</li> <li>2. Photo sensor OP2 on the engine board may be defective.</li> </ol>  |             |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Replace the defective actuator.</li> <li>2-1. U6 (74HC245) pin 15 should be over 3.5V when OP2 sensor is blocked, and below 0.7V when the sensor is not blocked.</li> <li>2-2. One end of R24 in the transmitter of OP2 should be 5V, and the other end 1.2V.</li> <li>2-3. If the related resistors are good, check for short circuit of OP2 receiver.<br/>If OP2 is normal, replace U6 (74HC245).</li> </ol> |             |       |         |
| <b>Remark</b>  |             |       |         |
| <b>Others</b>  |             |       |         |

## Error code 3-040/3-041

| Fault   | Cover Open | Model | ML-xxxx |
|---|------------|-------|---------|
| <b>Description</b> <ul style="list-style-type: none"> <li>• The ERROR lamp is on even when the printer cover is closed.</li> <li>• The ERROR lamp does not come on even when the printer cover is open.</li> </ul>  |            |       |         |
| <b>Check</b> <ol style="list-style-type: none"> <li>1. Hook lever in the top cover (Refer to ② on page 6-4.)</li> <li>2. Engine board</li> <li>3. Actuator-cover open (Refer to ④⑧ ④⑨ on page 6-6.)</li> </ol>  |            |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. The hook lever may be defective.</li> <li>2. Malfunction of the circuit containing the micro switch SW151 and its related parts on the engine board.</li> <li>3. Defective actuator-cover open.</li> </ol>   |            |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Replace the hook lever, if defective.</li> <li>2. Check SW151 and its related parts : <ol style="list-style-type: none"> <li>2-1. Check SMPS 24V output.</li> <li>2-2. Check D4 anode when SW151 is pressed. D4 anode will be below 3.5V when SW151 is open. Check for R38 and R39, and replace if defective.</li> <li>2-3. If D4 anode is over 3.5V, check if CPU pin 48 is short. If not, replace CPU.</li> </ol> </li> <li>3. Replace the defective actuator.</li> </ol> |            |       |         |
| <b>Remark</b>   |            |       |         |
| <b>Others</b>   |            |       |         |

## Error code 3-050

| Fault   | All Lamps Blinking | Model | ML-xxxx |
|---|--------------------|-------|---------|
| <b>Description</b><br>When printer power is on, all lamps on the operator panel blink.  |                    |       |         |
| <b>Check</b><br>1. Harness between the engine and control boards<br>2. Engine board   |                    |       |         |
| <b>Cause</b><br>Defective interface between the engine board and control boards (DCU error code '78')   |                    |       |         |
| <b>Solution</b><br>1. Check the harness between the engine and control boards.<br>2-1. Check if the engine board works properly when the printer resets. U5 pin 1 should be below 0.7V for about 122 ms after power is on, then remain over 3.5V.<br>-Check U5 pin 2 = approx. 3.8V. If so, check R54 or R55.<br>-Check U5 pin 3 = approx 4V. If so, check R53 or R56, or C35.<br>-If the voltages are normal, and U5 pin 1 is below 0.7V, replace U5.<br>-If all are normal, check CPU pin 55. If OK, replace CPU.<br>2-2. Check for X1 oscillation (6.94407MHz).<br>2-3. Replace EPROM in the engine board, if defective.<br>2-4. If all above are OK, replace CPU. |                    |       |         |
| <b>Remark</b>   |                    |       |         |
| <b>Others</b><br>U4, U202, Q9   |                    |       |         |

## Error code 3-060

| Fault   | Memory Overflow | Model | ML-xxxx |
|---|-----------------|-------|---------|
| <b>Description</b><br>When printing, error message is printed out.    |                 |       |         |
| <b>Check</b><br>Control board   |                 |       |         |
| <b>Cause</b><br>Insufficient printer memory.                          |                 |       |         |
| <b>Solution</b><br>Install optional SIMM memory in the control board. |                 |       |         |
| <b>Remark</b>   |                 |       |         |
| <b>Others</b>   |                 |       |         |

## Error code 3-080

| Fault   | Defective motor operation | Model | ML-xxxx |
|---|---------------------------|-------|---------|
| <b>Description</b><br>Main motor is not driving when printing, and paper does not feed into the printer, resulting 'Jam 0'.   |                           |       |         |
| <b>Check</b><br>1. Engine board<br>2. Sub motor board (Refer to ⑫ on page 6-6.)   |                           |       |         |
| <b>Cause</b><br>1. Motor harness or CN104 may be defective.<br>2. U1 defective in the sub motor board.  |                           |       |         |
| <b>Solution</b><br>1. Check the motor harness. replace it, if defective.<br>2-1. Perform DCU diagnostic code 00 and check the motor operation.<br>2-2. With DCU code '00', check for pulse at U1 pin 8 and pin 13. Or, check the related parts.<br>2-3. With DCU code '00', check U1 pin 4 and pin 17 are over 4V. If the pins are below 1V, check R424.<br>2-4. If all above are OK, replace U1. |                           |       |         |
| <b>Remark</b>   |                           |       |         |
| <b>Others</b>   |                           |       |         |



## Error code 3-090

| Fault   | Ear-splitting noise or allophone | Model | ML-xxxx |
|---|----------------------------------|-------|---------|
| <b>Description</b><br>While operating, ear-splitting noise occurs.  |                                  |       |         |
| <b>Check</b><br>LSU motor, Main motor bracket, Fan, Developer, Fuser gear   |                                  |       |         |
| <b>Cause</b><br>1. Defective LSU motor and main motor bracket, or defective harness<br><br>2. Foreign materials in the fuser gear or developer  |                                  |       |         |
| <b>Solution</b><br>1-1. Replace the LSU, if defective.<br>1-2. Check the main motor bracket or its wiring harness.<br>1-3. Check pick-up ass'y rolls.<br><br>2. Reassemble or replace the fuser and developer if defective. |                                  |       |         |
| <b>Remark</b>   |                                  |       |         |
| <b>Others</b>   |                                  |       |         |

## Error code 3-100

| Fault  | No power | Model | ML-xxxx |
|--|----------|-------|---------|
| <b>Description</b><br>When system power is turned on, all lamps on the operator panel do not come on.  |          |       |         |
| <b>Check</b><br>Engine board   |          |       |         |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Defective harness between engine and control boards.</li> <li>2. Defective harness between the control board and panel.</li> <li>3. Defective fuse F151</li> <li>4. Defective fuse F101</li> <li>5. BD101 short. Check for the resistance value of Q102.</li> <li>6. Defective U101</li> </ol>  |          |       |         |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Check the connection between engine and control boards, and replace, if defective.</li> <li>2. Check the connection between control board and operator panel. If defective, replace the harness.</li> <li>3. Check F151 on the engine board. If open, measure the resistance between 5V and ground. If it is below 50 ohm, it is short.</li> <li>4. Check F101 on the engine board. If open, check also :               <ul style="list-style-type: none"> <li>- R114 open</li> <li>- Q102, D-S, G-D, or G-S short</li> <li>- Defective BD101</li> </ul> </li> </ol> |          |       |         |
| <b>Remark</b>  |          |       |         |
| <b>Others</b>  |          |       |         |

## Error code 3-110

| Fault  | Vertical line getting curved | Model | ML-xxxx |
|--|------------------------------|-------|---------|
| <b>Description</b><br>When printing, vertical line gets curved.  |                              |       |         |
| <b>Check</b><br>LSU<br>Engine board  |                              |       |         |
| <b>Cause</b><br>1. For LSU, +24V supply is unstable in the engine board.<br>2. Difference according to LSU vendors   |                              |       |         |
| <b>Solution</b> <ul style="list-style-type: none"> <li>• Check the capacitor between CN 3 pin 5 and +24V is 100nF.</li> <li>• Check the resistor R63 (12.1Kohm).</li> <li>• Replace LSU.</li> <li>• Replace the main board.</li> </ul> |                              |       |         |
| <b>Remark</b>  |                              |       |         |
| <b>Others</b>  |                              |       |         |

|   |                    |              |                |
|---|--------------------|--------------|----------------|
| <b>Fault</b>  | <b>All LEDs On</b> | <b>Model</b> | <b>ML-xxxx</b> |
| <b>Description</b><br>When turning on, all LEDs are continuously on.  |                    |              |                |
| <b>Check</b><br>Fuser, LSU, Engine board  |                    |              |                |
| <b>Cause</b> <ol style="list-style-type: none"> <li>1. Fuser error</li> <li>2. LSU error</li> <li>3. Bad connection between engine board and control board.</li> </ol>  |                    |              |                |
| <b>Solution</b> <ol style="list-style-type: none"> <li>1. Replace the fuser.</li> <li>2. Replace the LSU.</li> <li>3. Check the wiring between the engine board and the control board.</li> <li>4. Replace engine board.</li> </ol> |                    |              |                |
| <b>Remark</b>   |                    |              |                |
| <b>Others</b>   |                    |              |                |

| Fault   | Jitter | Model | ML-xxxx |
|---|--------|-------|---------|
| <b>Description</b><br>When printing, image is irregular.                      |        |       |         |
| <b>Check</b><br>LSU, Motor bracket  |        |       |         |
| <b>Cause</b><br>1. LSU hexahedron period<br>2. Defective motor bracket gears  |        |       |         |
| <b>Solution</b><br>1. Replace the LSU.<br>2. Replace the motor bracket ass'y. |        |       |         |
| <b>Remark</b>   |        |       |         |
| <b>Others</b>   |        |       |         |

## 4. Disassembly and Reassembly

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### 4-1. General Precautions on Disassembly

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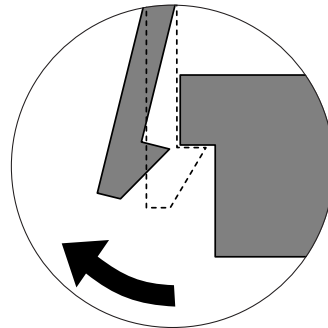
When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must. If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Remove the paper cassette(s), and the print cartridge. Do not expose the cartridge to direct room light or sun light, and be careful not to scratch the drum surface.
2. Turn the power switch off.
3. Unplug all the cables from the printer.
4. Replace with only an authorized component.
5. Do not force to open or fasten a plastic material component.
6. Be careful no obstacles are included when you reassemble components.
7. When you reassemble components, be careful small size components are located in place.
8. If you turn the machine over to replace some parts, toner or paper particles may contaminate the LSU window. Protect the LSU window with clean paper.

### Releasing Plastic Latches

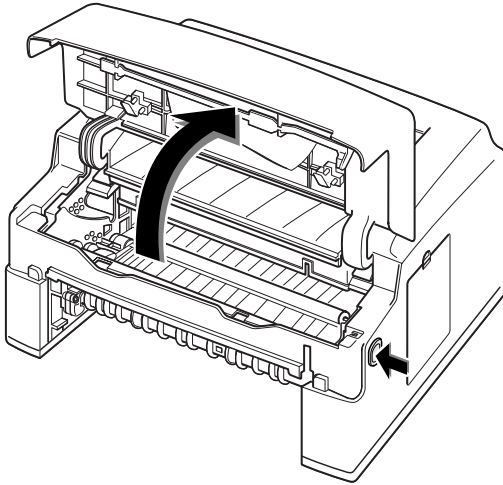
Many of the parts are held in place with plastic latches. The latches break easily; release them carefully. To remove such parts, press the hook end of the latch away from the part to which it is latched.



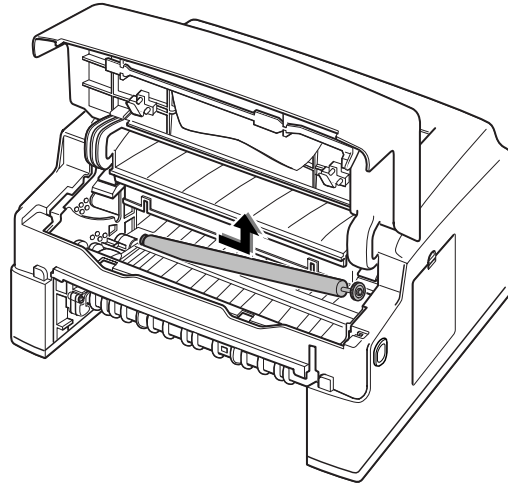
## 4-2. Transfer Roller

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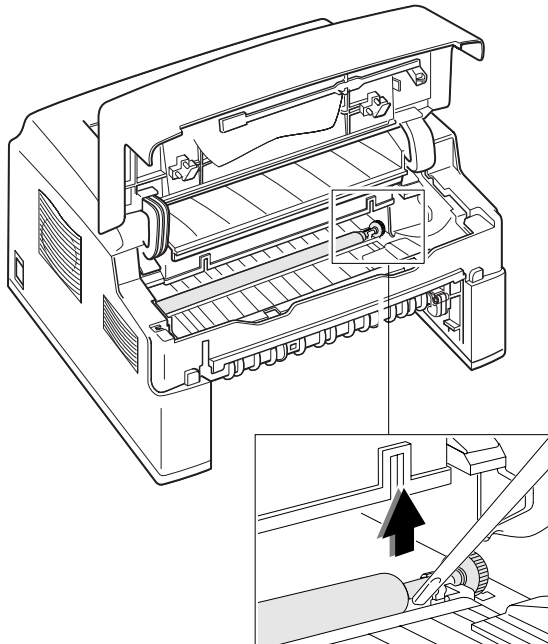
1. Press the cover open switch and raise the printer cover.



3. Pull the roller slightly to the right to release the left end of the roller, then take it out.

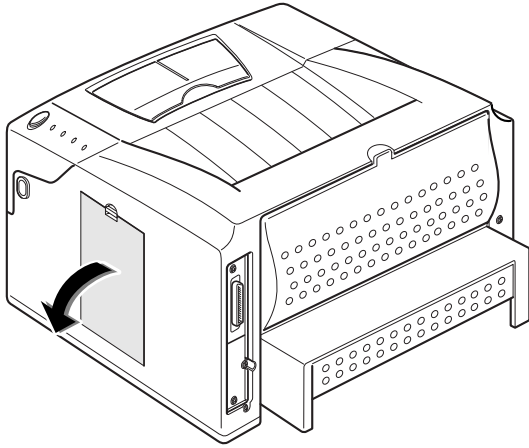


2. Use a phillips screwdriver to release the right end of the roller.

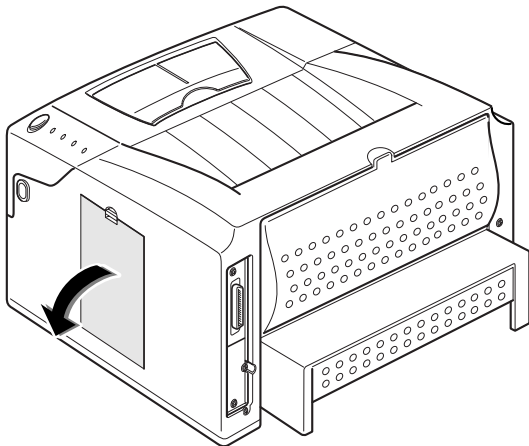


## 4-3. Controller Board

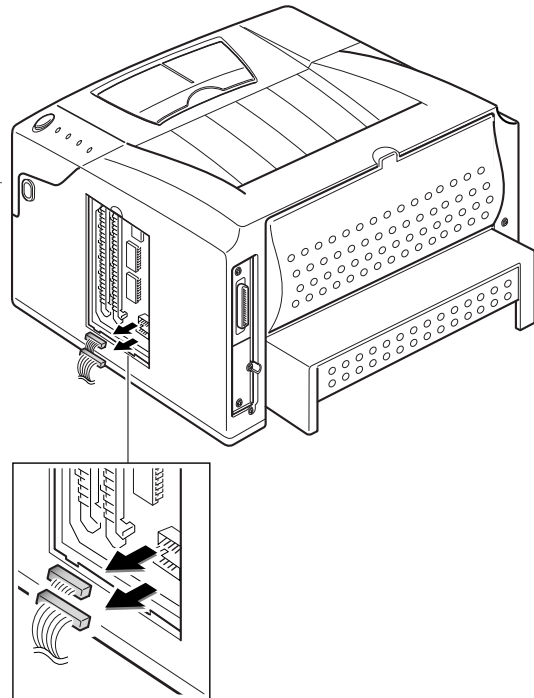
1. Remove the cover located at the right side of the printer.



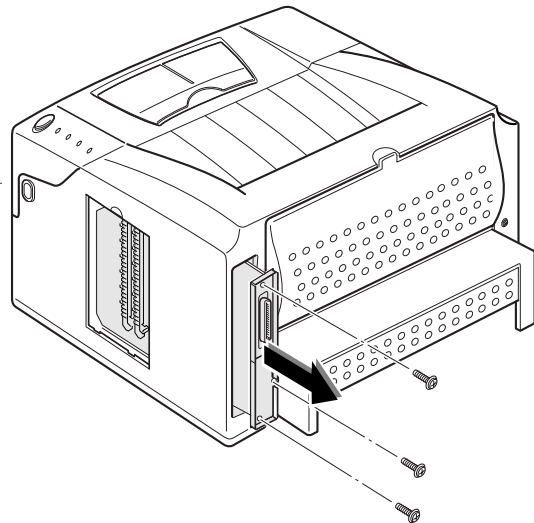
2. Remove one screw. Slide the shield cover in the direction of OPEN arrow marked on the cover, then remove the cover.



3. Unplug two connectors from the board.



4. Remove three screws securing the board and pull the board out of the printer.



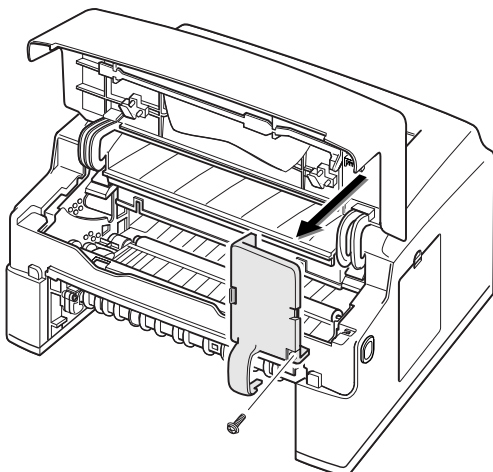


## 4-4. Panel Board

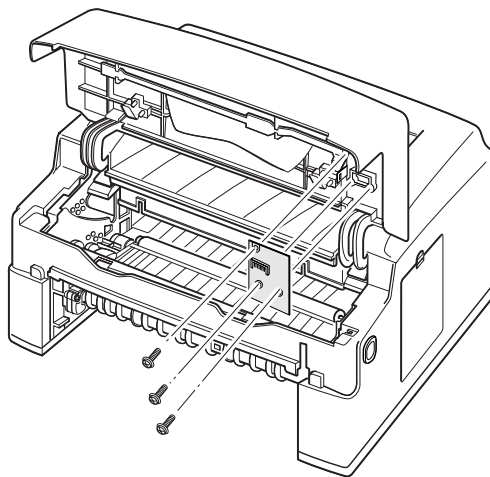
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1. Press the cover open switch and raise the printer cover.

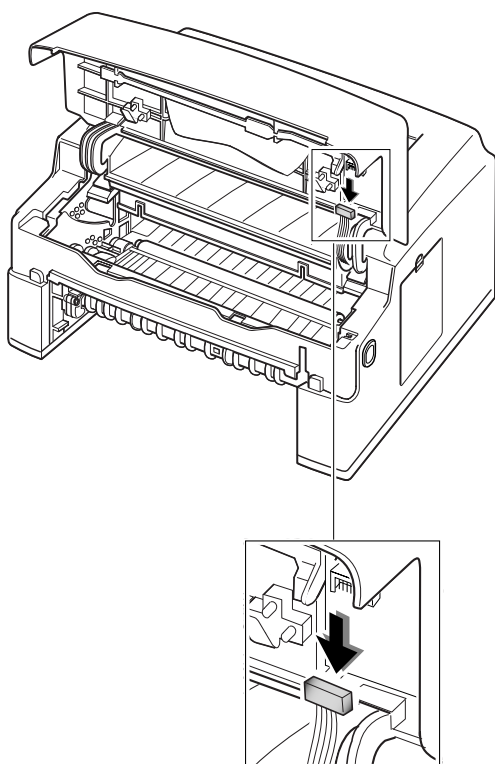
2. Remove the panel cap.



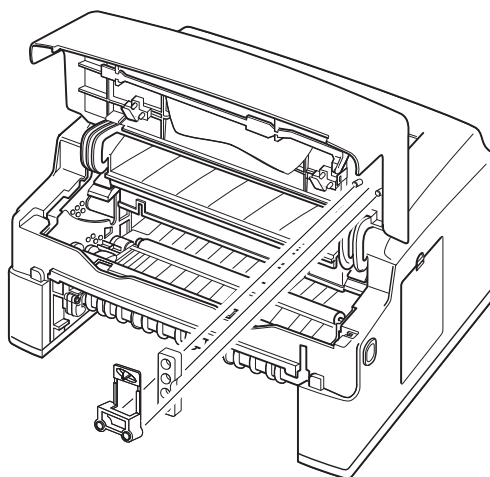
4. Remove three screws from the board, and remove the board.



3. Unplug one connector from the panel board.

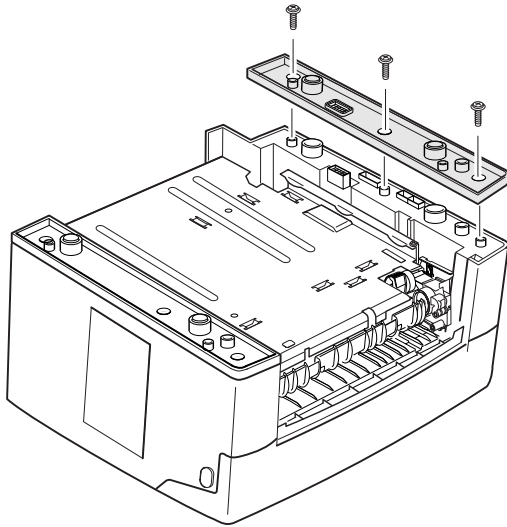


5. Remove the Window LED and button panel LED.

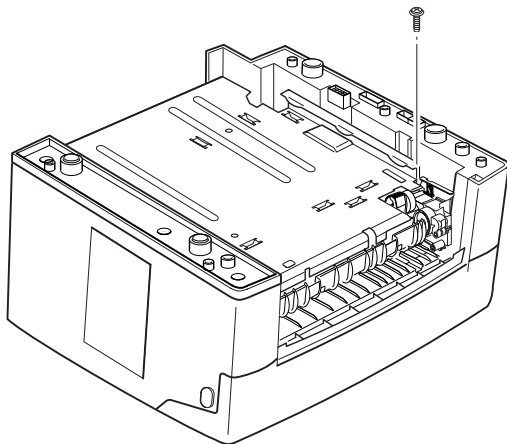


## 4-5. Pickup Assembly

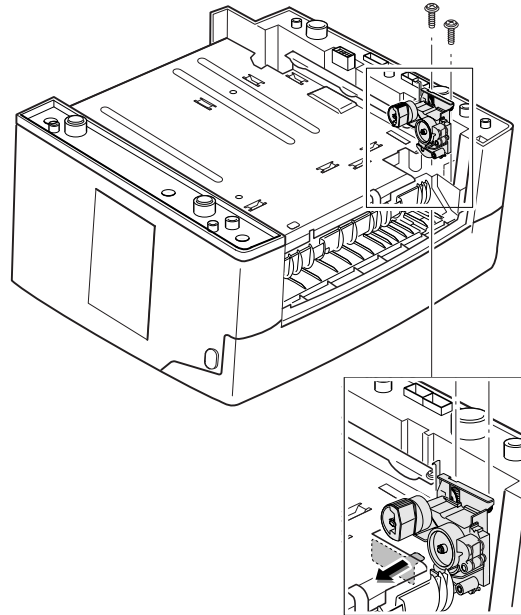
1. Turn the printer over. Remove three screws from the left base bracket, and take the bracket out.



2. Remove one ground screw.

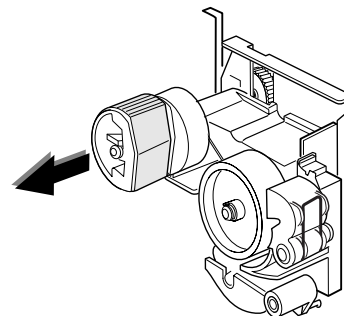


3. Remove two screws securing the pickup assembly and take the assembly out.

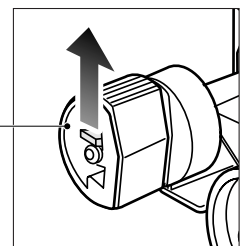


*Push the solenoid if you have difficulty to remove the pickup assembly.*

4. Check the pickup rubber wear. If the rubber is heavily worn, replace it with a new one.



*Squeeze this tab to remove the rubber.*



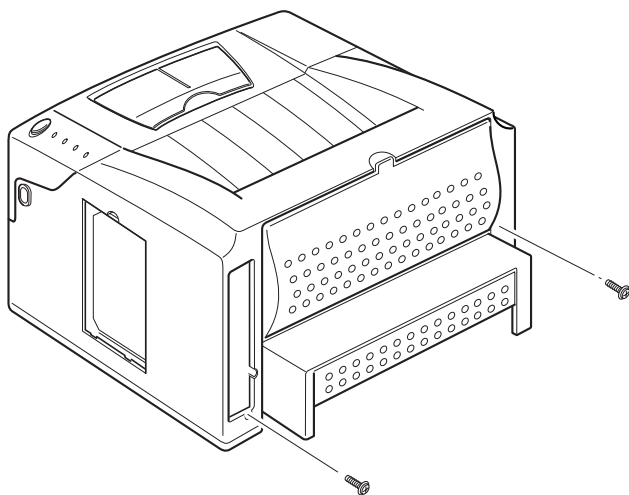
## 4-6. Main Cover

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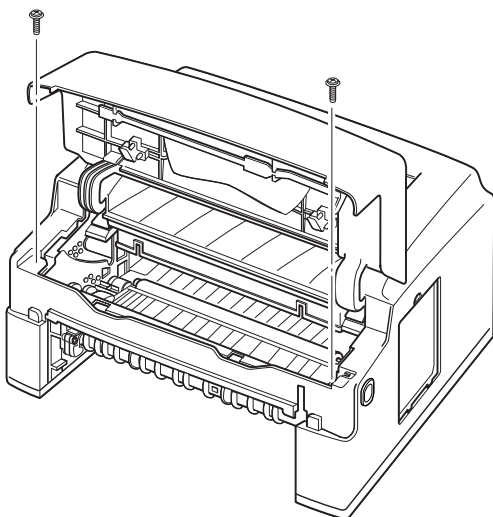
1. Before you remove the cover, you should remove:

-Controller Board (see page 4-3)

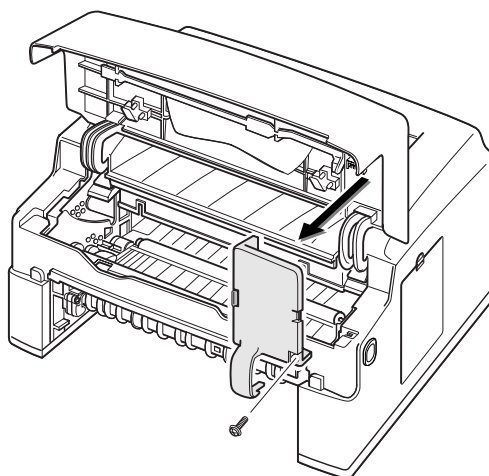
2. Remove two screws at the back of the printer.



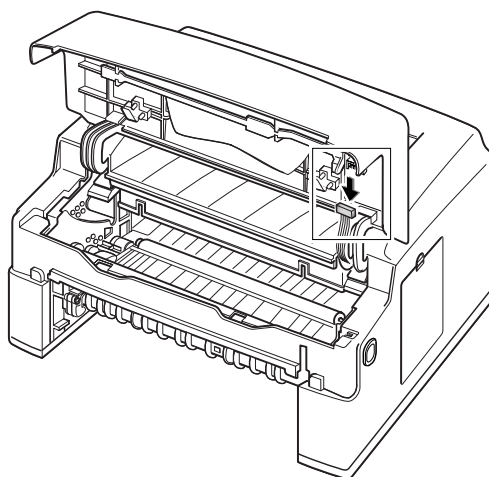
3. Open the printer cover, and remove two screws.



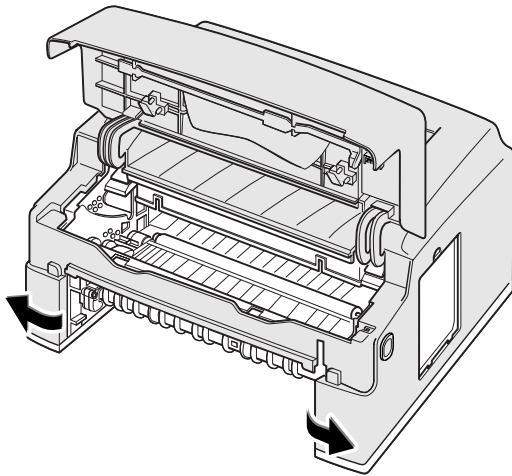
4. Remove the panel cap inside the operator panel.



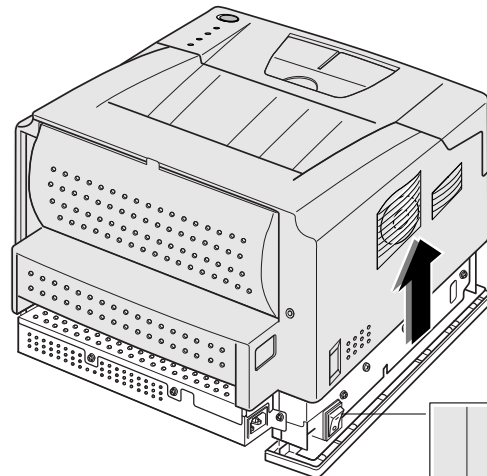
5. Unplug one connector from the panel board.



6. Unlatch the front ends of the cover.



7. Slide the main cover upward, out of printer.



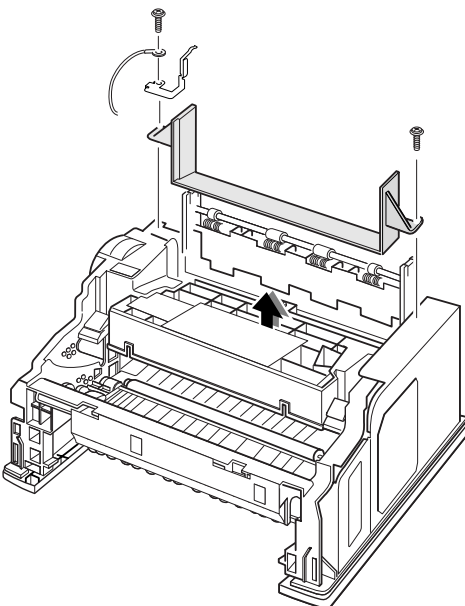
*Note that the power switch is properly released from the cover.*

## 4-7. LSU

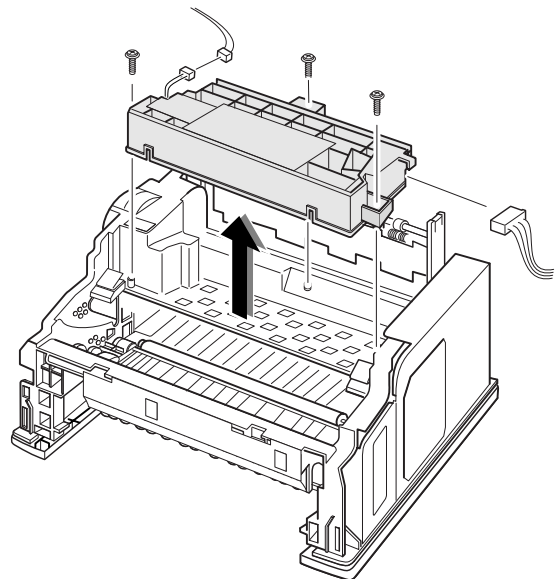
1. Before you remove the LSU, you should remove:

- Controller Board (see page 4-3)
- Main Cover (see page 4-6)

2. Remove two screws securing the fuser cover, and remove the fuser cover.



3. Remove three screws, and remove the LSU. Then unplug two connectors from the LSU.

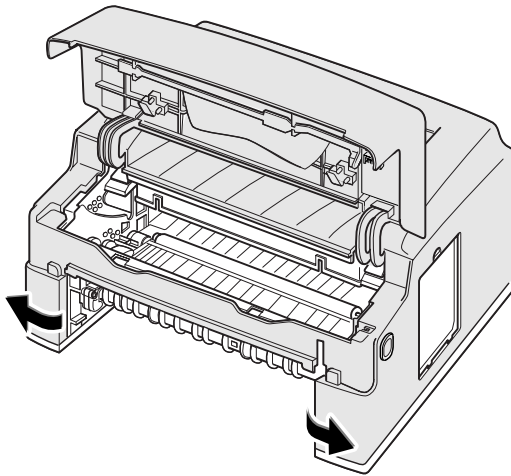


## 4-8. Exit Assembly

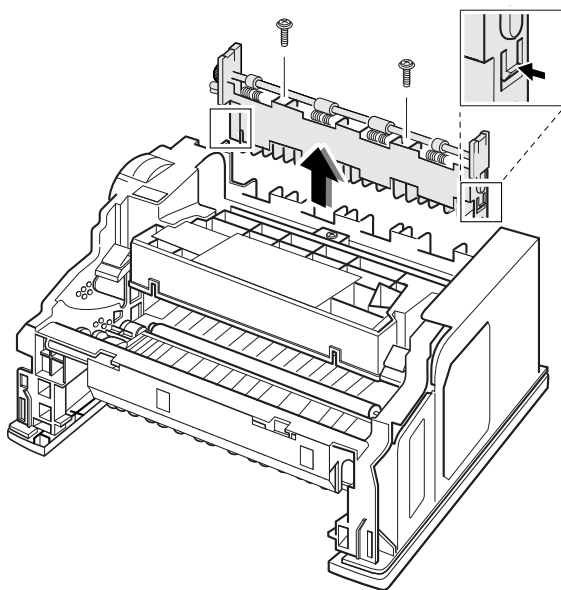
1. Before you remove the exit assembly, you should remove:

- Controller Board (see page 4-3)
- Main Cover (see page 4-6)
- Fuser Cover (see page 4-10)

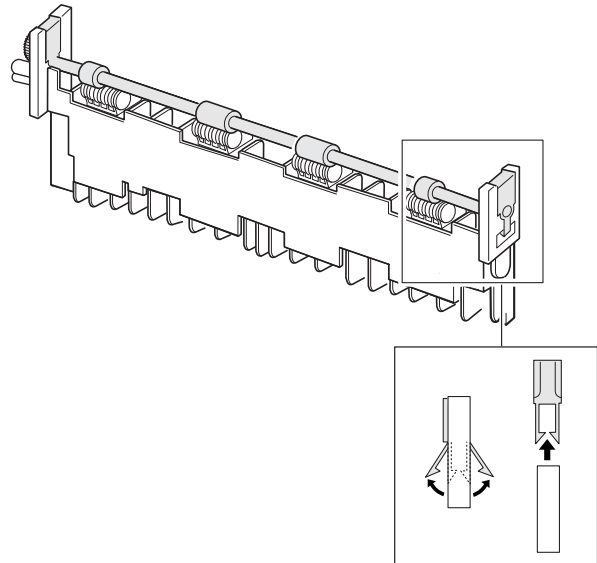
2. Remove three screws, and remove the bracket.



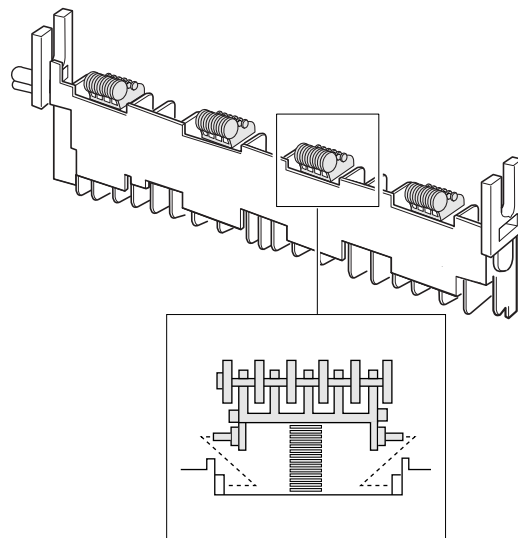
3. Remove two screws, unlatch the exit tray and take it out.



4. If you want to remove the roller shaft, unlatch both ends of the shaft and take it out.



5. If you want to remove the exit rollers, squeeze the bottom of roller and take it out.

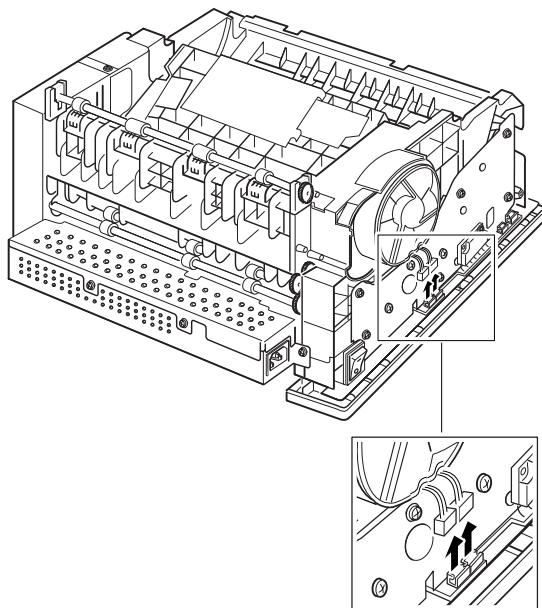


## 4-9. Drive Assembly and Fan

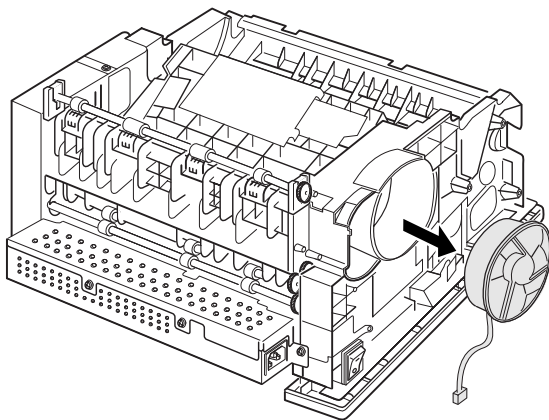
1. Before you remove the drive assembly or fan, you should remove:

- Controller Board (see page 4-3)
- Main Cover (see page 4-6)

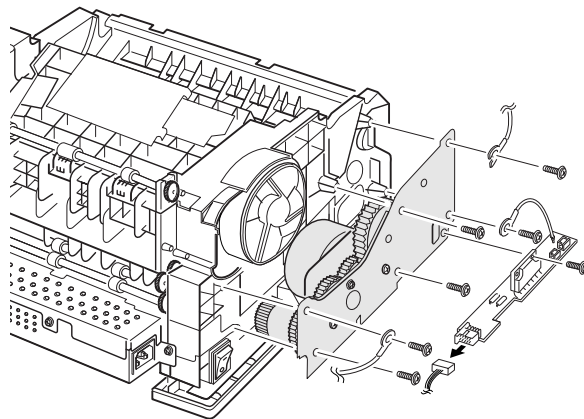
2. Unplug two connectors.



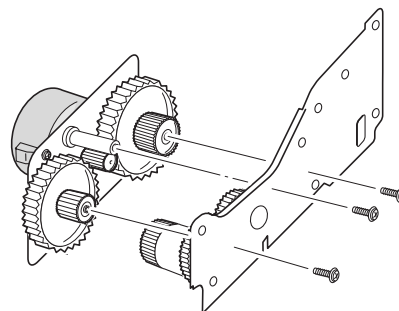
3. If you want to replace the fan, take the fan out.



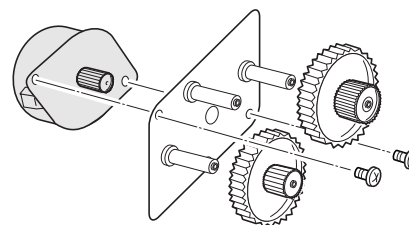
4. Remove seven screws securing the drive assembly from the gear bracket, and remove the drive assembly and motor drive board. Unplug one connector from the board.



5. If you want to remove the motor from the drive assembly, remove three gold screws securing the motor assembly to the gear bracket.



6. Remove the motor assembly. Remove two screws securing the motor to the motor bracket, then take the motor out.





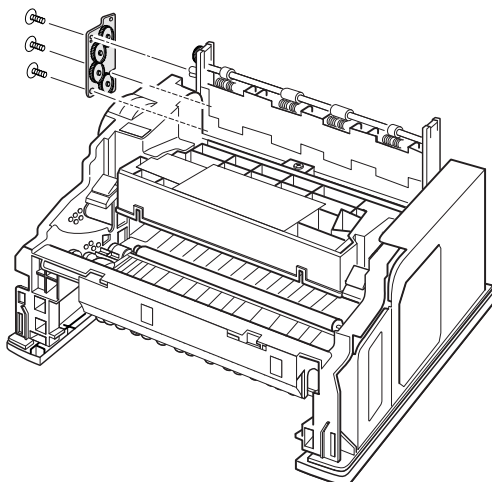
## 4-10. Fuser

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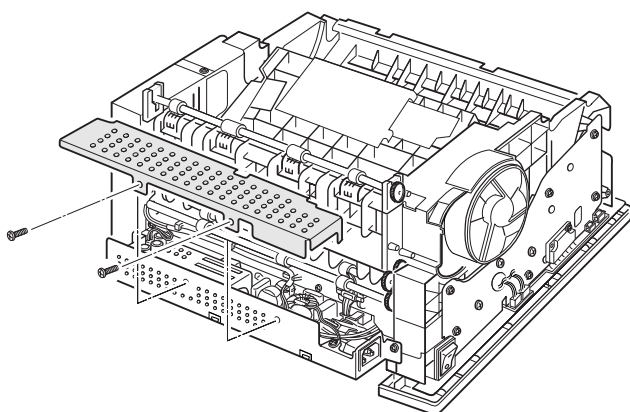
1. Before you remove the fuser, you should remove:

- Controller Board (see page 4-3)
- Main Cover (see page 4-6)

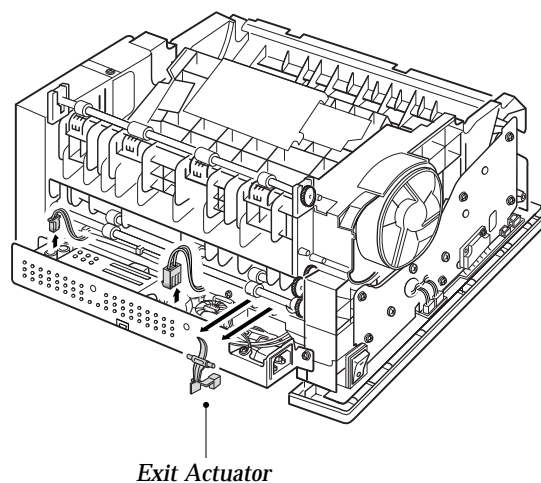
2. Remove three screws, and remove the bracket.



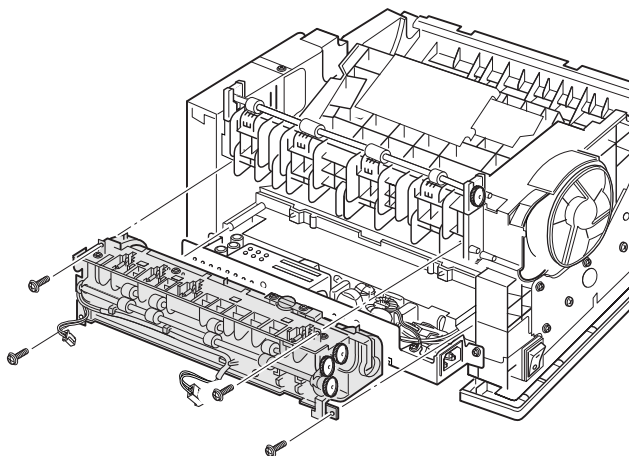
3. Remove two screws from the SMPS bracket.



4. Remove the exit actuator. Unplug two connectors.

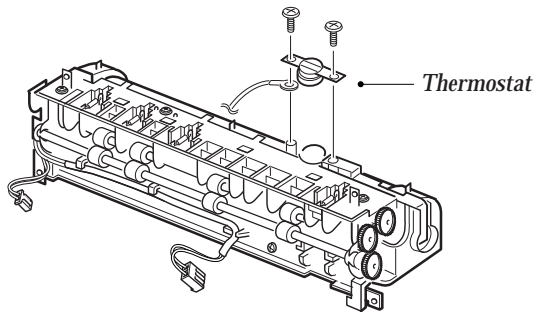


5. Remove four screws, and remove the fuser assembly.



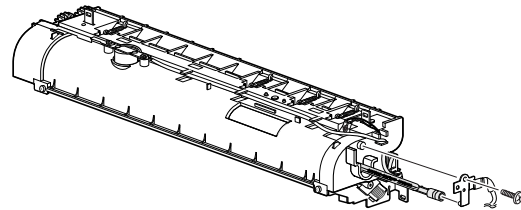
**To remove the thermostat from the fuser assembly :**

Remove two screws, and take the thermostat out.



**To remove the halogen lamp from the fuser assembly :**

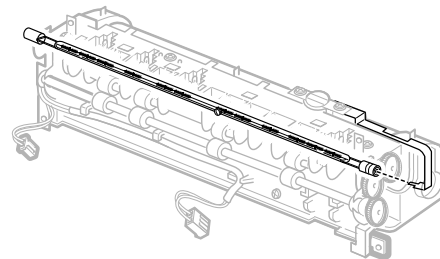
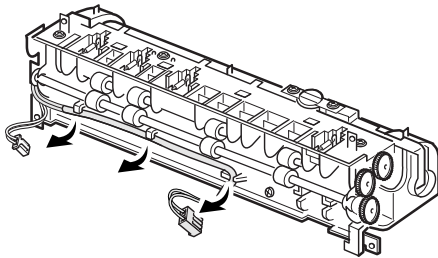
Remove one screw.



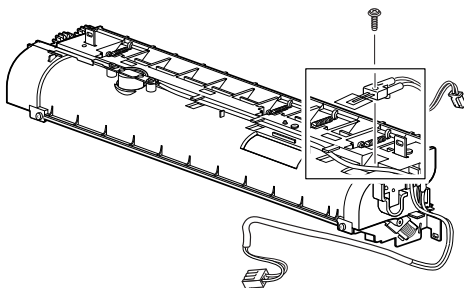
**Note:** When you reassemble the halogen lamp, make sure that it is inserted into the slot properly.

**To remove the thermistor from the fuser assembly :**

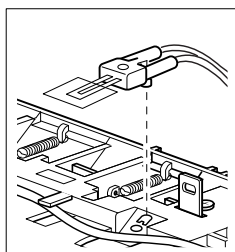
1. Release the wire from the three holders.



2. Remove one screw, then take the thermistor out.



**Note:** When you reassemble the thermistor, make sure that it puts in place.





## 4-11. Engine Board and Miscellaneous

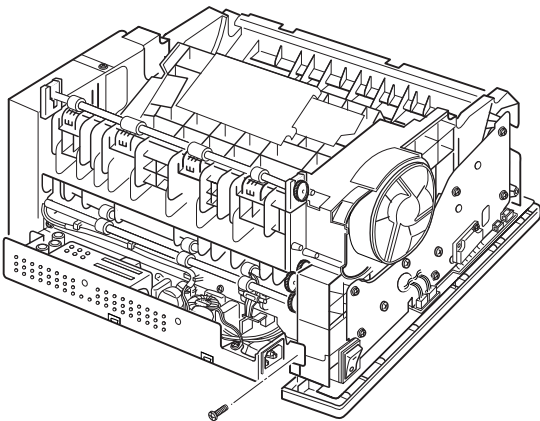
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1. Before you remove the engine board, you should remove:

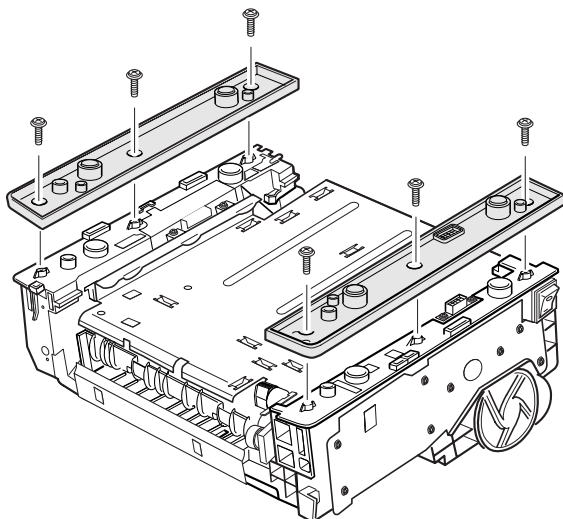
- Controller Board (see page 4-3)
- Main Cover (see page 4-6)

2. Remove the SMPS bracket as described in '4-10 Fuser' and unplug four connectors.

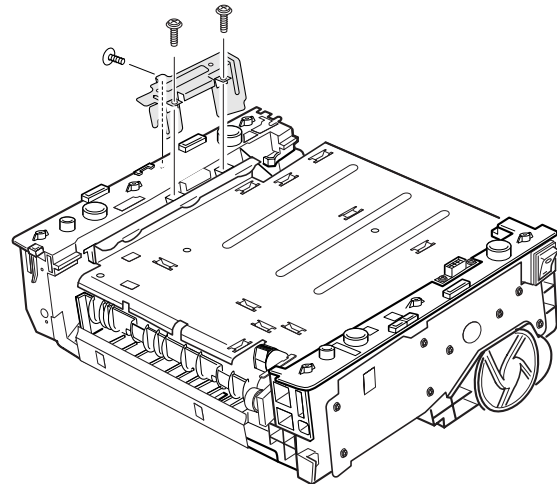
3. Remove one screw from the engine board.



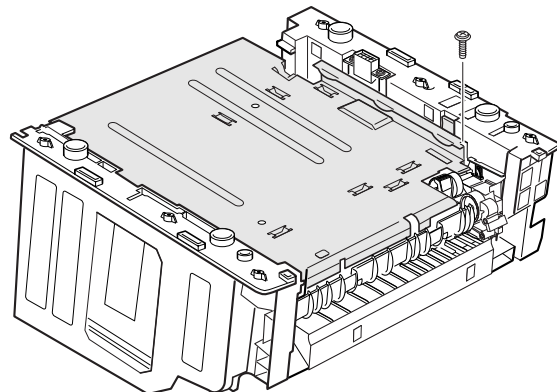
4. Turn the printer over. Remove six screws from the left and the right base brackets, and take them out.



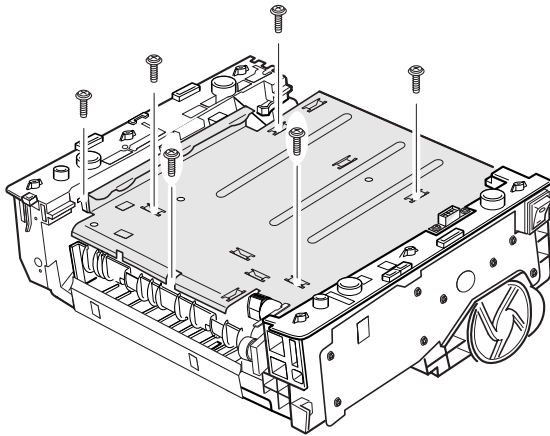
5. Remove three screws securing the ICU ground, and remove the ICU ground.



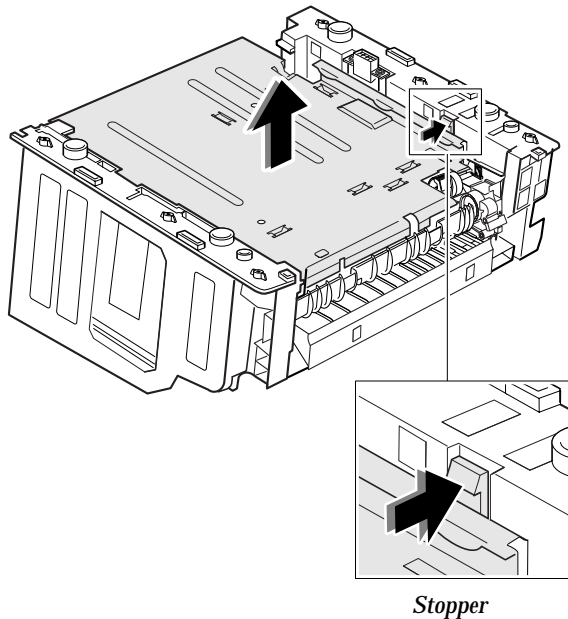
6. Remove one ground screw.



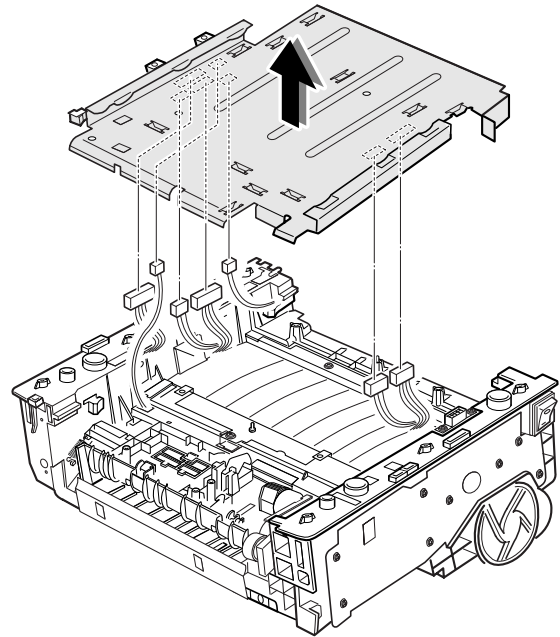
7. Remove six screws securing the PCU shield.



8. While you push the stopper to release the PCU shield, take the PCU shield out of the printer.

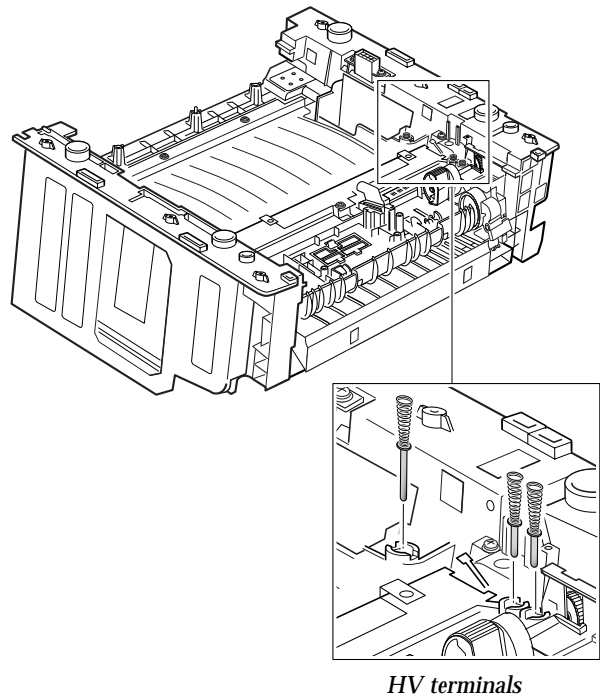


9. Unplug all connectors from the PCU shield, and remove the shield.



**To replace HV terminals :**

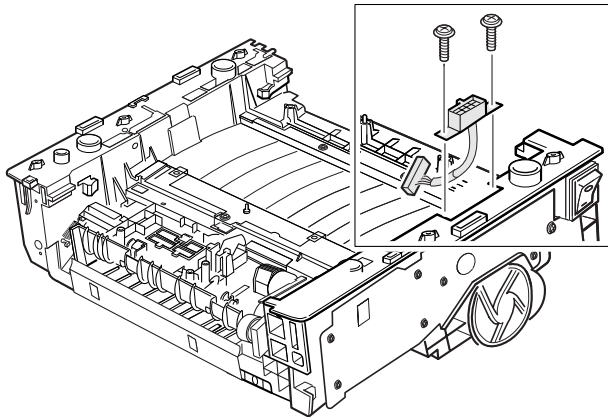
Remove the terminals.



**Note:** When you replace with new ones, be careful that they are inserted in place.

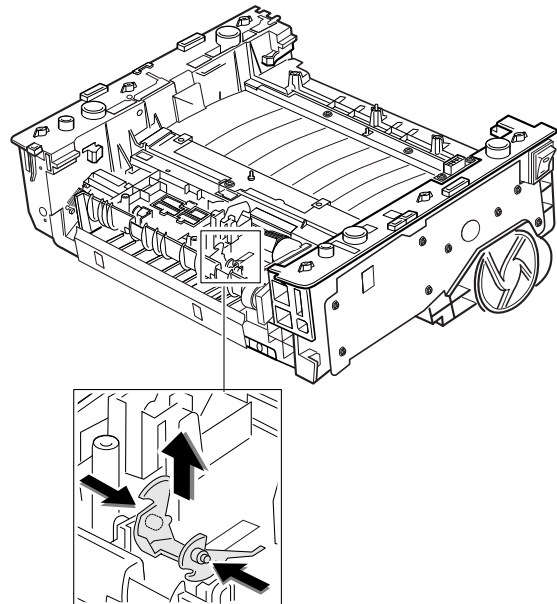
**To replace the SCF connector :**

Remove two screws and take it out.



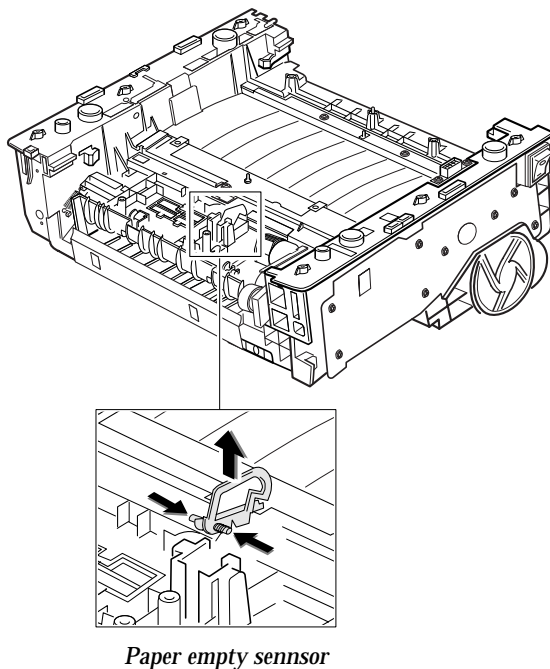
**To replace the pickup sensor :**

Take the sensor out while you push the both ends of the sensor.



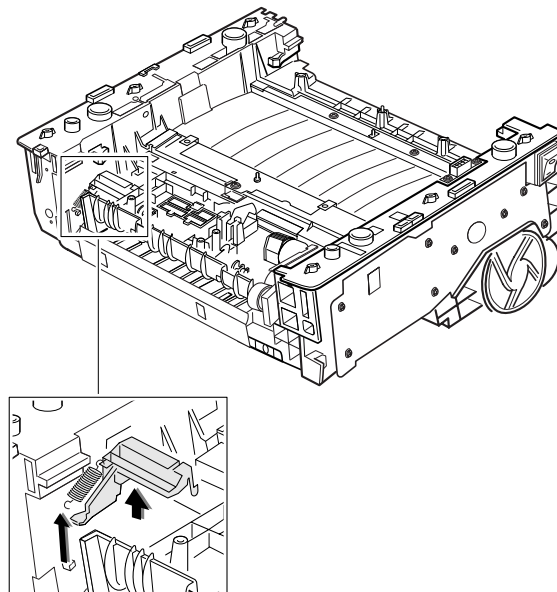
**To replace the paper empty sensor :**

Take the sensor out while you push the both ends of the sensor inward.



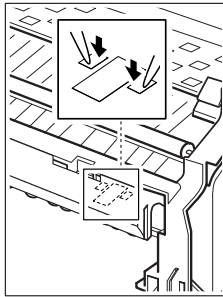
**To replace the cover open sensor :**

Remove the spring and take it out.

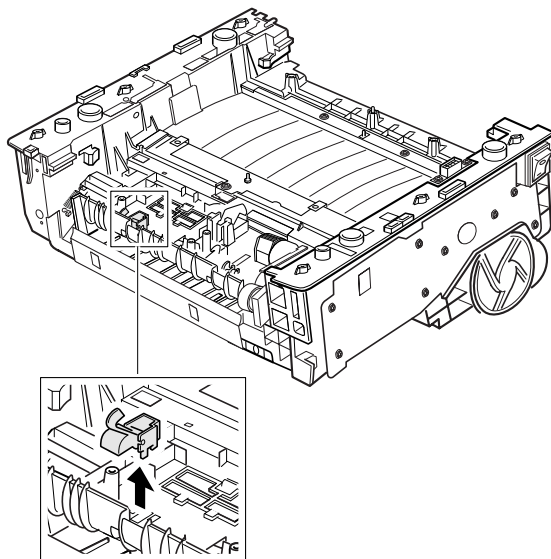


**To replace the actuator :**

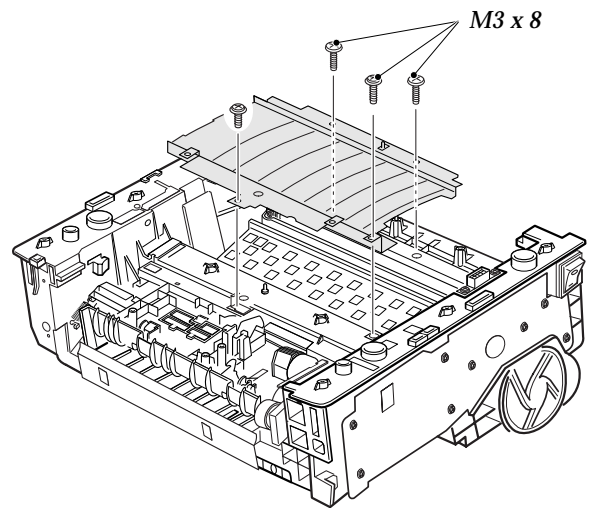
1. Turn the mechanism back and push down the points as shown to unlatch the actuator.



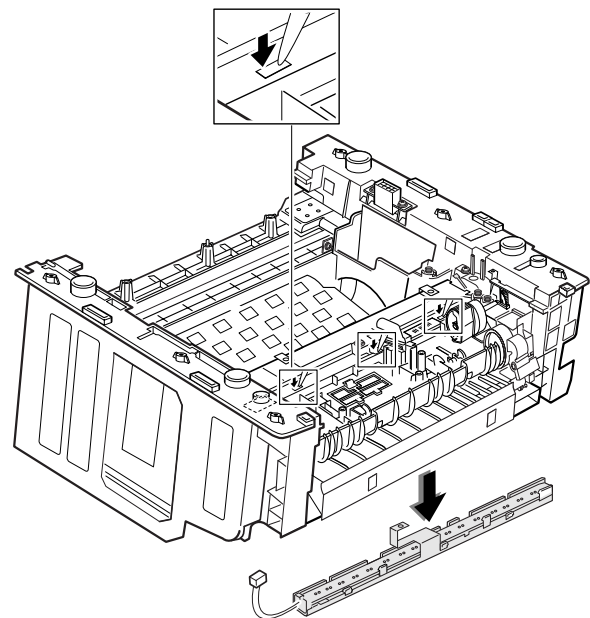
2. Turn the unit over, and remove the actuator.

**To remove the transfer guide :**

Remove four screws and take the guide out.

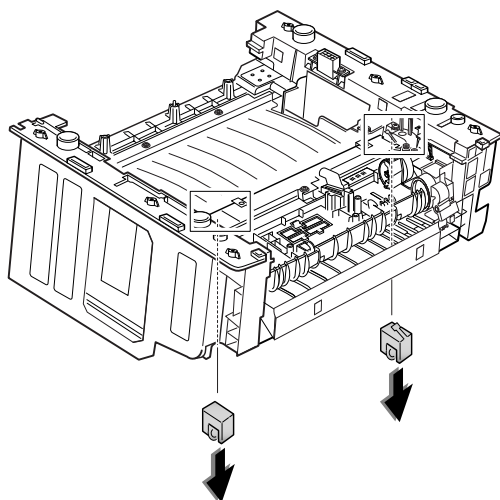
**To replace the PTL module :**

Release the three tabs latching the sensor using a phillips screwdriver, then push the sensor down.



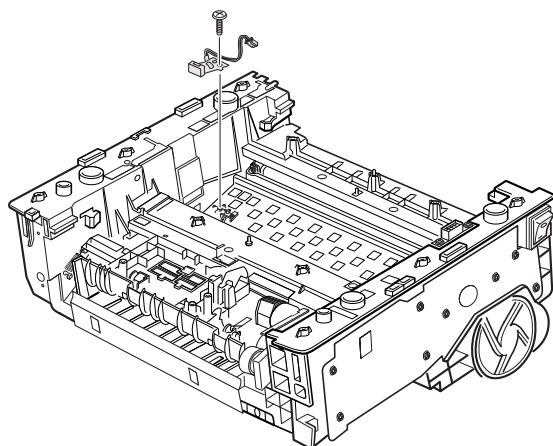
**To replace the transfer roller bushings  
(left and right) :**

Release each tab latching the left and right holder,  
then push the holder down.

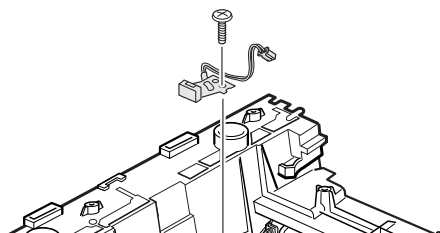


**To replace the thermistor assembly :**

Remove one screw, and remove the thermistor  
assembly.



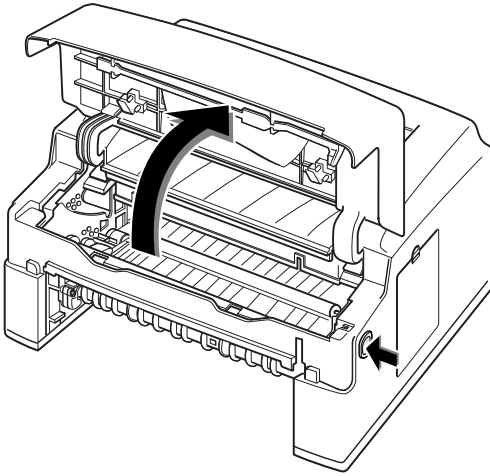
**Note:** When you reassemble the thermistor assembly,  
make sure that it puts in place.



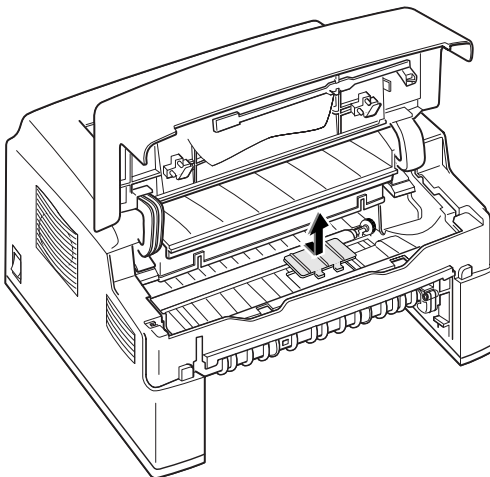
## 4-12. ROM

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1. Press the cover open switch and raise the printer cover.

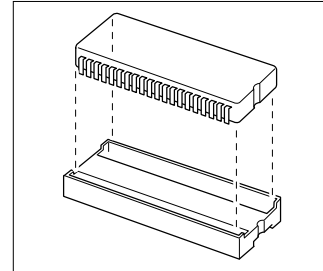


2. Remove the ROM cover.



3. Replace ROM using the specified jig.

**Note:** When you install a new ROM, be careful for the direction.



## Memo



## 2. Specifications

**Note:** It is subject to change without notice.

| Item                       | Specification & Description  |            |                              |         |              |        |               |         |           |         |           |
|----------------------------|--|------------|------------------------------|---------|--------------|--------|---------------|---------|-----------|---------|-----------|
| Engine                     | MLE-6000   |            |                              |         |              |        |               |         |           |         |           |
| Print Speed                | 12PPM (A4 Size, 5% Character Pattern)  |            |                              |         |              |        |               |         |           |         |           |
| Resolution                 | True 600 x 600 dpi   |            |                              |         |              |        |               |         |           |         |           |
| Source of Light            | Laser Diode (LSU:Laser Scanner Unit)   |            |                              |         |              |        |               |         |           |         |           |
| Print Method               | Non-impact Electrophotography  |            |                              |         |              |        |               |         |           |         |           |
| Feed Method                | Cassette & Manual, Option Feeder   |            |                              |         |              |        |               |         |           |         |           |
| Paper Handling (input)     | <p>*Size</p> <p>(1) Standard : A4, Letter, Legal, B5, Executive, Folio</p> <p>(2) Envelope : manual feed only</p> <table border="1"> <tr> <th>Paper Type</th><th>Paper size(mm<sup>2</sup>)</th></tr> <tr> <td>Monarch</td><td>98.5 x 190.5</td></tr> <tr> <td>Com-10</td><td>104.9 x 241.3</td></tr> <tr> <td>Intl-DL</td><td>110 x 220</td></tr> <tr> <td>Intl C5</td><td>162 x 229</td></tr> </table> <p>(3) Universal type</p> <p>Length : 150 ~ 356 mm</p> <p>Width : 90 ~ 216 mm</p> <p>*Weigh : For Cassette, 60 ~ 90 g/m<sup>2</sup></p> <p>For Manual, 60 ~ 120 g/m<sup>2</sup></p> <p>*Recommended Paper</p> <p>USA : X420, X4024, NEKOSA, BOISECASCADE</p> <p>EC : REFLEX, ADAGIO</p> <p>Transparancies : 3M(CG3300 or 3360)</p> <p>Label : AVERY 53XX series</p> | Paper Type | Paper size(mm <sup>2</sup> ) | Monarch | 98.5 x 190.5 | Com-10 | 104.9 x 241.3 | Intl-DL | 110 x 220 | Intl C5 | 162 x 229 |
| Paper Type                 | Paper size(mm <sup>2</sup> )   |            |                              |         |              |        |               |         |           |         |           |
| Monarch                    | 98.5 x 190.5   |            |                              |         |              |        |               |         |           |         |           |
| Com-10                     | 104.9 x 241.3  |            |                              |         |              |        |               |         |           |         |           |
| Intl-DL                    | 110 x 220  |            |                              |         |              |        |               |         |           |         |           |
| Intl C5                    | 162 x 229  |            |                              |         |              |        |               |         |           |         |           |
| Paper Handling (output)    | Face Down : 250 sheets, Face Up : 1 sheet  |            |                              |         |              |        |               |         |           |         |           |
| Feed Capacity              | 250 sheet tray<br>one option 250 sheet Drawer  |            |                              |         |              |        |               |         |           |         |           |
| Warm-up time               | 70 seconds or less (23°C, 50%)   |            |                              |         |              |        |               |         |           |         |           |
| First Print Time           | 14 seconds or less (Fast Mode)   |            |                              |         |              |        |               |         |           |         |           |
| Power Rating               | AC100~120V / 220~240V(±15%), 50/60Hz (±3%)   |            |                              |         |              |        |               |         |           |         |           |
| Power Consumption          | 300W Printing Avg/14W pring sleep  |            |                              |         |              |        |               |         |           |         |           |
| Power Saving               | During Sleep : Max 28 W  |            |                              |         |              |        |               |         |           |         |           |
| Consumption                | Less than 30W during 1 hour when it turned on  |            |                              |         |              |        |               |         |           |         |           |
| Certification & Compliance | C-UL, TUV, FCC, CDRH, CE, CB   |            |                              |         |              |        |               |         |           |         |           |



## Specifications

| Item                  | Specification & Description   |
|-----------------------|---|
| Acoustic Noise        | Stand by : Less than 36dB, Operating : Less than 49dB   |
| Toner Supply          | Print Cartridge   |
| Expected Life Span    | 150,000 sheets  |
| Operating Environment | Temperature : 10~30°C, Humidity : 20~80%RH  |
| Storage Environment   | Temperature : 0~35°C, Humidity : 10~90%RH   |
| Weigh                 | Net : Max 11Kg, Gross : 12Kg  |
| External Dimension    | 360 (W) x 368 (D) x 220 (H)mm   |
| Print Cartridge       | Life Span : 5,000 pages, 5% Pattern<br>Developing : Non-magnetic Contact Developing<br>Charging : Conductive Roller Charging<br>Density Adjustment : 3 step (Light, Medium, Dark)<br>Toner Supply Method : Exchanging the Developer<br>Toner Checking Sensor : None<br>Transfer System : Conductive Roller Transfer<br>Fusing System : Temperature & Pressure<br>Ozone Emission : Less than 0.1 PPM |
| Emulation             | PCL5e, PCLXL (compatible with HP LaserJet 5P)   |
| Font                  | 1 bitmap<br>45 scalable (35 intelligent, 10 truetype)   |
| CPU                   | ARM7 KS32C6100  |
| RAM Memory            | Standard 4M byte (16M bit x 2)<br>Option SIMM Module ; 4, 8, 16, 32M byte<br>*Refer to Operator's Guide for instructions on SIMM installation.  |
| ROM                   | 2M byte (8M bit x 2 : Program) Flash Memory   |
| EEPROM                | 512 bytes   |
| Interface             | Bidirectional Parallel Standard<br>- IEEE 1284 COMPATIBLE MODE<br>- IEEE 1284 NIBBLE MODE<br>- IEEE 1284 BYTE MODE<br>- IEEE 1284 ECP WITHOUT RLE<br>- IEEE 1284 ECP WITH RLE   |

## 3. Reference Information

### 3-1. Abbreviations and Acronyms

Tables 3-1-1 and 3-1-2 list abbreviations and acronyms which may be found in this service manual.

#### Abbreviations

| Abbr    | Definition  | Abbr     | Definition                    |
|---------|---|----------|-------------------------------|
| amps    | amperes   | motor_pa | Motor phase A                 |
| ass'y   | assembly  | motor_pb | Motor phase B                 |
| badac   | bad access  | mpx      | multiplex                     |
| bps     | bits per second                                       | neg      | negative                      |
| CBUSY   | Command busy  | od       | open drain                    |
| CCLK    | Command clock   | OSC      | oscillator                    |
| clk     | clock   | OUT      | output                        |
| cm      | centimeter(s)   | pba      | printed board assembly        |
| CMSG    | Command message                                       | pcb      | printed circuit board         |
| CON     | connector   | pix      | picture                       |
| DS      | Data Strobe   | Pmotor   | LSU motor on                  |
| EBUSY   | Engine Status busy                                    | pos      | positive or position          |
| EMSG    | Engine Status message                                 | pot      | potential                     |
| Exitpap | Exit paper  | ppm      | print pages per minute        |
| GND     | ground  | PRINT    | Print command                 |
| HLDA    | hold acknowledge                                      | psync    | page synchronization          |
| hldar   | hold acknowledge received                             | pwr      | power                         |
| HLDR    | hold request  | Q_Lamp   | Quenching Lamp                |
| HOR     | horizontal  | qty      | quantity                      |
| HSYNC   | Horizontal sync                                       | READY    | Engine print ready            |
| I/O     | Input and Output                                      | sw       | switch                        |
| in      | inch(es) or input                                     | tach     | tachometer                    |
| INT     | Interrupt   | thvea    | Transfer high voltage Enable  |
| INTA    | Interrupt Acknowledge                                 | Vcc      | collector supply voltage (dc) |
| INTR    | Interrupt Request                                     | VDI      | Video data from controller    |
| lb.     | Pound(s)  | VDO      | Video data output             |
| LDON    | laser Diode On  | vert     | vertical                      |
| lin     | linearit  | Vp-p     | peak-to-peak voltage          |
| lock    | bus lock  | VR       | variable resistor             |
| Lready  | LSU power ready                                       | mm       | millimeter(s)                 |
| ADC     | Analog to Digital Converter                           | LED      | Light Emitting Diode          |
| ALE     | Address-Latch Enable                                  | LSU      | Laser Scanner Unit            |
| ASCII   | American Standard Code for<br>Information Interchange | MHV      | Main High Voltage             |
|         |   | MPU      | Micro Processor Unit          |

| Abbr   | Definition  | Abbr | Definition                       |
|--------|---|------|----------------------------------|
| BIOS   | Basic Input/Output System                           | NC   | No Connection                    |
| BPS    | Bits Per Second                                     | PCB  | Printed Circuit Board            |
| CMOS   | Complementary Metal Oxide Semiconductor             | PCU  | Printed Control Unit             |
| CPU    | Central Processing Unit                             | PLCC | Plastic Leaded Chip Carrier      |
| DCU    | Diagnostic Control Unit                             | PPM  | Page Per Minute                  |
| DMA    | Direct Memory Access or Dynamic Memory Access       | PQFP | Plastic Quad Flat Package        |
| DMAC   | Direct Memory Access Controller                     | PWM  | Pulse Width Modulation           |
| DOS    | Disk Operating System                               | QFP  | Quad Flat Package                |
| DPI    | Dots Per Inch (resolution)                          | RAM  | Random Access Memory             |
| DRAM   | Dynamic Random Access Memory                        | ROM  | Read Only Memory                 |
| DVM    | Digital Voltmeter                                   | SCC  | Serial Communications Controller |
| EEPROM | Electrically Erasable Programmable Read Only Memory | SMPS | Switching Mode Power Supply      |
| ICU    | Image Control Unit                                  | SOP  | Small Outline Package            |
|        |   | THV  | Transfer High Voltage            |
|        |   | TS   | Tri-State                        |
|        |   | VCU  | Video Control Unit               |

## 3-2. Chip Replacement (SMD)

### 3-2-1. Precautions for Chip Replacement

1. Do not directly touch any portion of the part with the soldering iron. ICs, especially TSOPs, are easily damaged by heat.
2. Use care with the soldering iron tip and avoid rapidly heating parts. Some parts can be damaged by sudden heating. Preheat the part at about 100°C for several minutes before installing it.
3. Use a soldering tip temperature of about 240°C. For larger parts, use a slightly higher temperature (about 280°C).
4. The thin (0.3mm) solder for miniature parts does not contain adequate flux. Supplementary flux is thus needed in most cases.

Computer, OA and A/V systems are manufactured using flux which can be cleaned by water. When you replace the part or when troubleshooting, use proper flux and solder which can be cleaned by water.

Improper flux may cause the soldering area to corrode and may cause a fatal system error.

5. Use care not to damage the circuit pattern, especially when desoldering. Because of the many pins, cleanliness of the pattern is extremely important after removing an IC.
6. Use care to avoid solder bridges. Remove any bridges that occur.
7. Position the part carefully. This also affects the soldering operation. Be very precise in positioning the IC. Soldering opposite pins first holds the IC in place and makes soldering the other pins easier.
8. Do not reuse removed parts.
9. Check for solder joints, especially miniature parts with small lead.
10. A defective trimming resistor cannot be adjusted externally. Replace with an ordinary variable resistor.
11. Always inspect the work with a magnifying lens. Check after installing cold solder joints, etc.

### 3-2-2. Tools for Chip Replacement

The tools for chip replacement are as follows:

- Thin tip type soldering iron.
- Small flat-blade tip type soldering iron
- Special desoldering tip iron
- Air-blower Unit
- Flat Package Pick-up
- Flux that can be cleaned by water
- 0.3mm thin solder that can be cleaned by water
- Desoldering wire
- Tweezers

### 3-2-3. Chip Resistor and Chip Capacitors

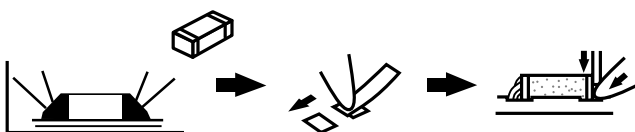
#### TYPES

The types of chip resistors and chip capacitor are as follows:

- Thick Film Chip Resistors
- Carbon Film Chip Resistors
- Metal Film Chip Resistors
- Chip Ceramic Capacitors
- Chip Trimming Resistors

#### REMOVING

1. Using Two soldering irons:
  - a. Use thin tip soldering irons
  - b. Use soldering tip temperature of about 280°C.
  - c. Simultaneously heat both ends of the part.
  - d. While heating, grasp the part with the tips of the soldering irons and remove it.
  - e. Use desoldering wire to completely remove the old solder from the part location on the board. A clean pattern for installing the new part is very



#### INSTALLING

1. Clean the area where the new part is to be mounted.
2. Apply a water soluble flux.
3. Set part correctly into position and prevent it from shifting.
4. Bring the soldering iron tip close to the part contact without actually touching it. Melt thin (0.3mm) solder between the tip and part so that it flows into the part contact.
5. Check work quality with a magnifying lens.

### 3-2-4. Chip Tantalum Capacitors and Chip filters

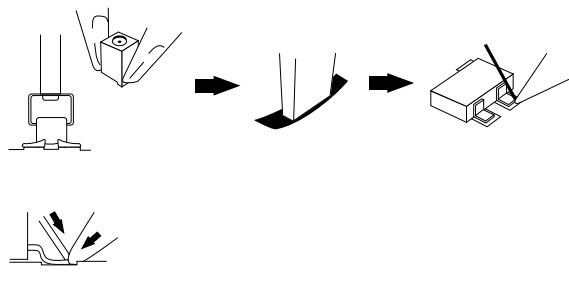
#### TYPES

The types of chip tantalum capacitors and chip filters are as follows:

- Chip Inductors
- Chip Tantalum Capacitors
- Chip Tantalum Electrolytic Capacitors
- Chip Aluminum Electrolytic Capacitors
- Chip Transformers
- Chip Filters

#### REMOVING

1. Using a special desoldering iron:
  - a. Select soldering tip according to part size.
  - b. Bring the tip into contact with the solder points.
  - c. When the solder melts, remove the part.
  - d. Remove the old solder with desoldering wire.
2. Using a special desoldering iron:
  - a. Use small flat-blade tips.
  - b. Heat both ends of the part simultaneously.
  - c. When the solder melts, grasp and remove the part with the soldering iron tips.



## INSTALLING

1. Clean the area where the new part is to be mounted.
2. Apply a water soluble flux.
3. Set part correctly into position and prevent it from shifting.
4. Use a sharp soldering iron tip. Bring the tip close to the part contact without actually touching it. Melt thin (0.3mm) solder between the tip and part so that it flows into the part contact.
5. Check work quality with a magnifying lens.

### 3-2-5. Chip VRs, Chip Trimmer Capacitors, Diode and Tr.

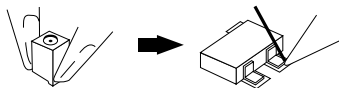
#### TYPES

The types of parts are as follows:

- Chip VRs
- Chip Trimmer Capacitors
- Diode
- Transistors

#### REMOVING

1. Using two soldering irons.
  - a. Use small-flat-blade tips.
  - b. Heat the leads of the part simultaneously.
  - c. When the solder melts, grasp and remove the part with the soldering iron tips.



#### INSTALLING

1. Clean the area where the new part is to be mounted.
2. Apply a water soluble flux.
3. Set part correctly into position and prevent it from shifting.
4. Use a sharp soldering iron tip. Bring close to the part contact without actually touching it. Melt thin (0.3mm) solder between the tip and part so that it flows into the part contact.

### 3-2-6. Chip ICs

#### TYPES

The types of chip ICs are as follows:

1. SOP (Small Outline Package) IC
2. SSOP (Shrink Small Outline Package) IC
3. VSOP (Very Small Outline Package) IC
4. QFP (Quad Flat Package) IC
5. VQFP (Very Quad Flat Package) IC
6. PLCC (Plastic Leaded Chip Carrier) IC
7. TSOP (Thin Small Outline Package) IC

#### REMOVING

1. Using special desoldering iron:
  - a. Select the tip according to the size shape of the IC.
  - b. "Tin" the tip with a small amount of the IC leads.
  - c. Set the tip squarely over the IC leads.
  - d. When the solder melts, carefully twist the iron.
  - e. Raise and remove the IC.
2. Using a shaped air-blower unit:
  - a. Select the correct nozzle.
  - b. Select the temperature and air-blow (suggested : temperature : 7, air-blow:4)
  - c. Engage the IC removing tool.
  - d. Use the air-blow the preheat the IC for about 5 seconds, then heat with the nozzle until the IC remove lifts the part from the board.

#### INSTALLING

1. Use desoldering wire to remove the previous solder
2. Clean the location.
3. Apply water soluble flux.
4. Position the IC and solder two pins at opposite sides.
5. Use a sharp tipped soldering iron and carefully solder each pin. (After gaining experience, a thicker tip can be used for better work efficiency)
6. Remove any solder bridges with desoldering wire.

### 3-3. Recommended Test Equipment

Samsung recommends the following equipment when servicing the Laser Printer.

|                               |   |
|-------------------------------|---|
| Digital Multimeter            | A digital multimeter with attached LED or LCD 4-digit Panel                       |
| Oscilloscope                  | A digitizing oscilloscope which can measure more than 100MHz                      |
| High Voltage Probe            | A high voltage probe which can measure about less than 10KV                       |
| DCU (Diagnostic Control Unit) | DCU can be supplied from Samsung which can easily shows the engine's error status |

Table 3-4-1 Equipment List

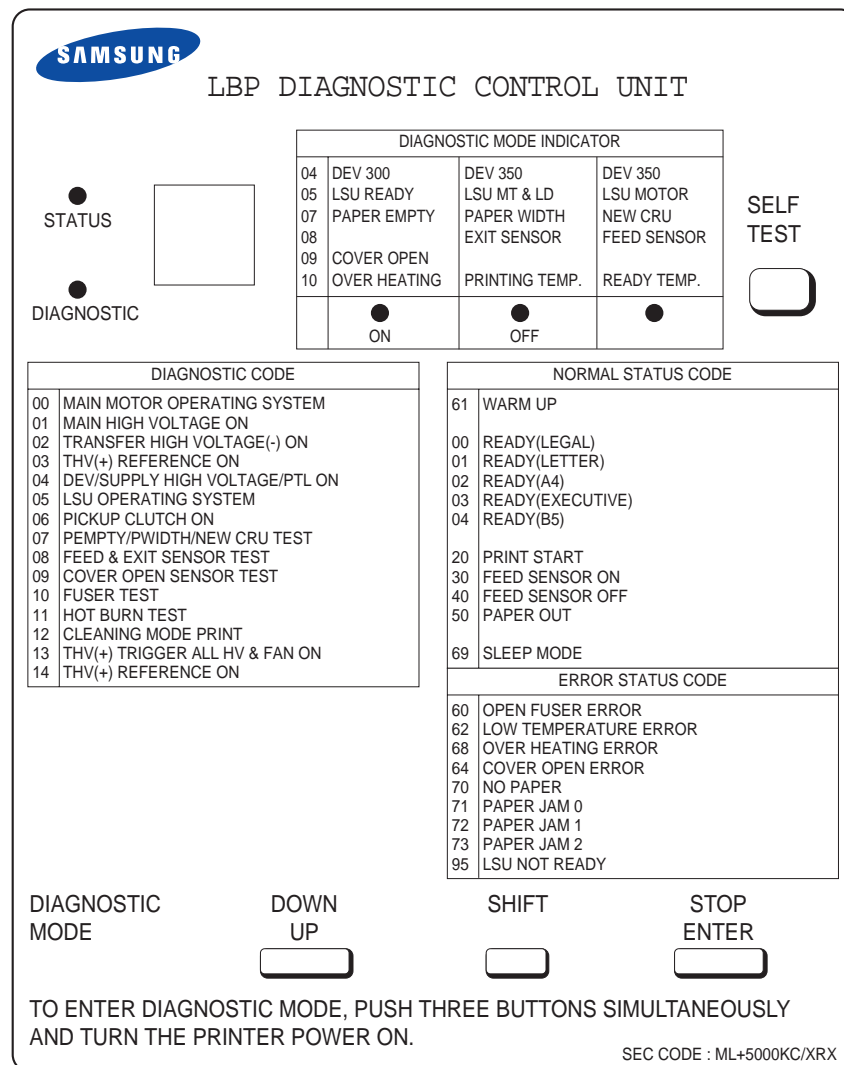


Figure 3-4-1 DCU

## 3-4. DCU Control

---

### 3-4-1. DCU Setup

- 1) Connect DCU to Controller Board Connector J6 (4 pins) or Engine Board CN2 (4pins).
- 2) To apply power, simultaneously press and hold down [DOWN], [SHIFT], and [STOP] keys. '78' is displayed.
- 3) After 2-3 seconds, release the keys. '00' is displayed.
- 4) Press [UP] or [SHIFT]+[DOWN] keys until the desired code number is displayed in the DCU display.
- 5) Press [ENTER] to begin operating.
- 6) Example : Select numbers '13' and '14' to adjust the electrophotography trigger voltage.
- 7) To end operation, press [SHIFT] and [STOP] keys.

### 3-4-2. DCU Diagnostic Mode

The DCU is used to diagnose the printer malfunction status.

| Display | Diagnostic Code Description    |
|---------|--------------------------------|
| 00      | MAIN MOTOR OPERATING SYSTEM    |
| 01      | MAIN HIGH VOLTAGE ON           |
| 02      | TRANSFER HIGH VOLTAGE(-) ON    |
| 03      | THV(+) REFERENCE ON            |
| 04      | DEV/SUPPLY HIGH VOLTAGE/PTL ON |
| 05      | LSU OPERATING SYSTEM           |
| 06      | PICKUP CLUTCH ON               |
| 07      | PEMPTY/PWIDTH/NEW CRU TEST     |
| 08      | FEED & EXIT SENSOR TEST        |
| 09      | COVER OPEN SENSOR TEST         |
| 10      | FUSER TEST                     |
| 11      | HOT BURN TEST                  |
| 12      | CLEANING MODE PRINT            |
| 13      | THV(+) TRIGGER ALL HV & FAN ON |
| 14      | THV(+) REFERENCE ON            |

### 3-4-3. DCU Error Status Code

DCU error code will indicate malfunction area of the machine.

| Display | Diagnostic Code Description |
|---------|-----------------------------|
| 60      | OPEN FUSER ERROR            |
| 62      | LOW TEMPERATURE ERROR       |
| 68      | OVER HEATING ERROR          |
| 64      | COVER OPEN ERROR            |
| 70      | NO PAPER                    |
| 71      | PAPER JAM 0                 |
| 72      | PAPER JAM 1                 |
| 73      | PAPER JAM 2                 |
| 95      | LSU NOT READY               |

### 3-4-4. Error Solution

| Display    | Solution   |
|------------|--|
| 60, 62, 68 | <ol style="list-style-type: none"> <li>1. Measure the resistance of the AC connector on the Fuser. Normal resistance is 2-4 ohms for 110V, 6-8 ohms for 220V.</li> <li>2. Check if the fuser lamp works properly.</li> <li>3. Measure the resistance at Q101 on the engine board. If abnormal, replace Q101, Q3, PC151, Q8.</li> </ol> |
| 70         | <ol style="list-style-type: none"> <li>1. Make sure that paper is loaded in the cassette.</li> <li>2. Replace OP2 sensor (photo interrupter).</li> <li>3. Check if the feed clutch works properly.</li> <li>4. If abnormal, replace the feed clutch or Q4 on the engine board.</li> </ol>  |
| 71         | <ol style="list-style-type: none"> <li>1. Make sure that paper is loaded in the cassette.</li> <li>2. Check for pick-up unit. If it is heavily worn, replace it with new one.</li> <li>3. Replace OP1 sensor.</li> </ol>   |
| 72, 73     | <ol style="list-style-type: none"> <li>1. Make sure that the paper being used meets the specification.</li> <li>2. Check if there is a paper jam in the fuser.</li> <li>3. Replace OP1, OP3 on the engine board.</li> <li>4. Check the fuser roller for any dirt. If dirty, clean the roller.</li> </ol>                               |
| 72, 73     | <ol style="list-style-type: none"> <li>1. Make sure that the paper being used meets the specification.</li> <li>2. Check if there is a paper jam in the fuser.</li> <li>3. Replace OP1, OP3 on the engine board.</li> <li>4. Check the fuser roller for any dirt. If dirty, clean the roller.</li> </ol>                               |
| 95         | <ol style="list-style-type: none"> <li>1. Check for U205 on the engine board.</li> <li>2. Replace LSU.</li> <li>3. Measure the resistance at R62 and R8. If abnormal, replace them.</li> </ol>   |



## Memo

# 1. Precautions

## 1-1. Safety Precautions


Read each caution carefully:

1. Do not use this printer near water or when exposed to inclement weather.
2. Do not place this printer on an unstable cart, stand or table; the product may fall, causing serious damage to the product.
3. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation and to protect the printer from overheating, do not block or cover any of these openings. Do not place the printer in an enclosure unless the enclosure provides adequate ventilation.
4. Never push objects of any kind into the printer through the cabinet ventilation slots as they may touch dangerous high voltage points, create short circuits, cause a fire, or produce an electrical shock. Never spill liquid of any kind on the printer.
5. Do not place the printer in a location where someone may trip on the cords.
6. Select a work surface that is large enough to hold the printer.
7. Position the printer within six feet of the computer and within five feet of an electrical outlet.
8. Operate this printer using the power source (110V, 220V, etc) indicated on the marking label. If you are not sure of the type of power source available, consult your dealer or local power company.
9. If you need to use an extension power cord with this printer, make sure that it uses a three-wire grounded cord and that the total ampere ratings for all of the products using the extension do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
10. Do not allow anything to rest on the power cord or data communications cable.
11. Unplug this printer from the wall outlet before cleaning. Do not use liquid cleaners or aerosol sprays. Use a damp cloth for cleaning.
12. Do not touch the surface of the photo-sensitive drum as marks or scratches may impair print quality.
13. Do not expose the drum unit to direct light for prolonged periods.
14. Use only standard papers, OHP films, and approved envelopes. Feed OHP films through the manual feed slot only. See specifications for approved papers and envelopes.
15. Other than replacing consumables such as paper and toner, refer all questions to qualified service personnel.

### LASER STATEMENT (LASERTURVALLISUUS)

WARNING: NEVER OPERATE AND SERVICE THE PRINTER WITH THE PROTECTIVE COVER REMOVED FROM LASER/SCANNER ASSEMBLY. THE REFLECTIVE BEAM, ALTHOUGH INVISIBLE, CAN DAMAGE YOUR EYES.

Allonpituus 770-795nm  
Teho 0.3mW±0.03mW

|   |                   |  |
|---|-------------------|--|
|  | <b>CAUTION</b>    | INVISIBLE LASER RADIATION WHEN THIS COVER OPEN. DO NOT OPEN THIS COVER.            |
|   | <b>VORSICHT</b>   | UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEOFFNET. NICHT DEM STRAHL AUSSETZEN.   |
|   | <b>ATTENTION</b>  | REYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU. |
|   | <b>ATTENZIONE</b> | RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA. EVITARE L'ESPOSIZIONE LA FASCIO.  |
|   | <b>PRECAUCION</b> | REDIACION LASER INVISIBLE CUANDO SE ABRE. EVITAR EXPONERSE AL RAYO.                |

## 1-2. Servicing Precautions

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**Note:** Requirements for AC power are described on the label affixed to the rear of the printer. Check the AC voltage rating requirement before use.

1. Before disassembly, pull the power plug from the AC power connector.
2. To avoid spilling toner inside the machine, do not turn the printer over or on its side before removing the developer cartridge.
3. Faulty installation of DRAMs may cause permanent damage to the Laser Printer.
4. Use only +5V power for video controller-related circuitry.
5. When replacing parts, use only the same type of part as the original. Replacing components with a second vendor's part may cause faulty operation.
6. Check the insulation between the blades of the AC plug and accessible conductive parts (examples : metal panels and input ports).
7. **Insulation Checking Procedure:**  
Disconnect the power cord from the AC power source. Connect an insulation resistance meter (500V) to the blades of the AC plug.  
The insulation resistance between each blade of the AC plug and accessible conductive parts (see left) should be greater than 1 megohm.
8. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.
9. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

## 1-3. ESD Precautions

---

Some semiconductor ("solid state") devices are easily damaged from static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESDs); examples include integrated circuits (ICs), Large-Scale Integrated circuits (LSIs), some field-effect transistors, and semiconductor chip components. The following techniques will reduce the occurrence of component damage caused by static electricity:

**CAUTION:** Be sure the power is off to the chassis or circuit board, and observe all other safety precautions

1. Immediately before handling any semiconductor components assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist strap device. (Be sure to remove the strap before applying power to the unit under test to avoid potential shock.)
2. After removing ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of an electrostatic charge.
3. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESDs.
4. Use only a ground-tip soldering iron when soldering or desoldering ESDs.
5. Use only anti-static solder removal device. Some solder removal devices are not rated as "anti-static;" these can accumulate sufficient electrical charge to damage ESDs.
6. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are package with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.
7. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Minimize body motions when handling unpackaged replacement ESDs. Motion such as your clothes brushing together, or lifting a foot from a carpeted floor can generate enough static electricity to damage an ESC.
9. Handle ICs and EPROMs carefully to avoid bending a pin.
10. Pay attention to the direction of parts when mounting or inserting them on a PCB.
11. Components can be permanently damaged if heated for longer than necessary while welding. All components are susceptible to heat damage.



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